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OBSERVATIONS

ON

ANEURISM.

OBSERVATIONS
ON
ANEURISM,
AND
SOME DISEASES
OF THE
ARTERIAL SYSTEM.

BY
GEORGE FREER,
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AND
SURGEON TO THE GENERAL HOSPITAL, NEAR BIRMINGHAM.*

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1807.



TO

JOHN JOHNSTONE, M.D.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, IN LONDON, AND PHYSICIAN TO THE
GENERAL HOSPITAL, NEAR BIRMINGHAM,

THIS BOOK IS INSCRIBED,

BY HIS OBLIGED,

AND FAITHFUL FRIEND,

GEORGE FREER.

THE following observations owe their birth to the case of J. M'DONALD, on whom I performed the operation of tying the iliac artery for the cure of femoral aneurism, the first time, that, I believe, it ever was performed with complete success. If they have any merit, it consists in their being derived solely from practice, for I know not that I have adduced one speculation, that has not the support of experience and facts.

*The whole of these observations was written, and the greater part of them printed off, before I heard of Professor Scarpa's magnificent work on aneurism. I am glad to find, that an English translation is preparing by J. H. Wishart, Esq. of Edinburgh,**

" Edinburgh, 5, Nicolson Square, October 12, 1807.

* " SIR,—As I have been engaged for some time in translating Professor Scarpa's Treatise on Aneurism, which is now in the press, I have taken the liberty of addressing you, as I am informed you have made this subject the object of your particular attention, and have met with several interesting cases.

" Prof. Scarpa's work, as appears from the review of it, inserted in the last number of Dr. Duncan's Surgical Journal, contains a much fuller and more comprehensive view of the subject of aneurism, than any book hitherto published, and a great part of the doctrines in it is quite new. But as several cases have occurred lately in this country, that have given rise to considerable discussion on several points of the pathology and practice with which the author is unacquainted, I am desirous of collecting these cases, to add to the number of the facts contained in this elaborate work.

" As Mr. Abernethy mentioned some time ago, in a publication on femoral aneurism, that you had likewise met with a similar case, in which the operation had been attended with success, I am induced, Sir, though I have not the honour of being personally

and should this humble attempt arrive at a second edition, I shall not fail to enrich it by the illustrations and reasonings of the great anatomist. From other authors I have not spared the quotation of such cases as illustrate the doctrines I have advanced; and to them, and to the suggestions of some learned friends, I owe much valuable information. To my diligent and intelligent pupil, Mr. Joseph Hodgson, I am indebted for the drawings, which accurately express the subjects they are intended to represent.

Against the accusation of defective style and neglect of the limæ labor, I am not ashamed to plead the want of habit and of skill. Let me implore the candour and indulgence of the reader for both, when he understands that my life has been spent, “not in the soft bowers of academical retirement,” but in the bustle and fatigue of an active and anxious profession.

known to you, to trouble you with this letter, to enquire if you intend publishing any account of that, or any other cases, that I might be enabled to refer to your work. If it is not your intention to make them public at present, you would confer on me a particular obligation, by favouring me with an account of your cases and mode of operation. I am particularly anxious to collect cases of inguinal aneurism, as Prof. Scarpa has not met with any in his own practice, or in the works of foreign surgeons, and the only cases, I believe, on record at present, are those of Mr. Abernethy.

“ I hope you will pardon this intrusion on your more important avocation from a stranger, whose principal motive for troubling you proceeds from his desire of illustrating so important a subject, and of contributing to the relief of his fellow creatures.

“ Your answer to this request as soon as circumstances will permit, will much oblige,

“ SIR, your most obedient humble servant,

“ JOHN HENRY WISHART.”

OBSERVATIONS

ON

ANEURISM.

THE diseases of the vascular system, with some of their causes, varieties, and modes of cure, have, from the earliest annals of science, occupied the attention of surgeons. Long before that period, when the cause of the circulation of the blood was ascertained, it was known that arteries were subject to aneurism, and that veins might become varicose; that great blood-vessels were vital parts, and that the smallest arteries would not unite when wounded, and that their wounds were therefore to be accounted dangerous. But amidst all these facts, and the speculations with which they would be naturally accompanied, practice advanced with slow and uncertain steps; and in regard to aneurism, even at the present day, we have no absolute and settled rule, which shall universally govern us in the management of this most formidable disease. Impressed

with the importance of the subject, I have endeavoured to reduce this branch of surgery to a more defined system, and to offer some observations, the result of my own practice and experience, which will tend to supersede the hazardous and painful operation now frequently adopted.

ARTERIES, like all other muscular parts, are composed of contracting fibres, arteries, veins, nerves, and absorbents, which are combined and knit into precise organization by different layers and beds of cellular membrane, and are subject to all the alterations of structure of soft parts, with their regenerative powers, also, when injured or diseased. Their vasa vasorum are not very perceptible in the natural state of arteries, but become distended and visible, when the vessel is irritated or inflamed. They do not arise from the artery itself, but from a distinct neighbouring vessel.

Mr. HUNTER injected the carotid artery with fine injection; but its vasa vasorum were not injected, nor are they ever filled by injecting the individual blood-vessels, on which they are destined to perform the function of arteries.

THIS part of the structure of the artery, together with that of its cellular membrane, which is the interposing medium between all the component parts of the artery, and the bed on

which its nerves, blood-vessels, and absorbents lie, I particularly desire to notice, as upon it will be founded many of the pathological doctrines to be adduced.

ARTERIES, like vascular parts of every other description, are subject to inflammation and its consequences; but these consequences are varied by their function and tubular structure. In all parts, when inflammation makes progress, it either terminates in the discharge of coagulable lymph, or the secretion of pus, both of which are healing endeavours of the physical powers to remedy the mischief, whatever it be, that has been done; or, in a third, and more fatal manner, in the mortification and death of the part inflamed.

ON the internal surface of canals, particularly the intestines, we generally see from their inflammation, that coagulable lymph is effused, and in strangulated hernia, we have frequent examples of all three effects in a narrow compass.

IN canals, too, the effects of inflammation are more particularly marked, by the narrowing, and sometimes the closing up of the passage, either by the swelling which accompanies inflammation, or by an union of the sides of the canal, through the intercession of the effusion of coagulable lymph. It is, perhaps, not necessary to observe, that the vessels which

pass through the cellular membrane surrounding inflamed parts, are the immediate causes of that swelling, tension, and redness which constantly attend inflammation. These vessels, by being irritated to increased action, push on their contents into the neighbouring ones; those vessels which did not carry red blood before, are now compelled to carry it, and thus the cellular membrane is swelled out in all its dimensions. Of course, if it surrounded an artery, it would diminish the size of the tube: if the increased action went on, coagulable lymph would be effused, and the vessel might be stopped: if it went further on, pus would be secreted, and the vessel might be disorganized: if it went still further on, mortification would ensue,

To produce the adhesive effects of inflammation, it is not necessary that both surfaces should pour out coagulable lymph; it is enough if the materials are furnished by one side, even though the other side be in a perfectly healthy state. Thus we often find cohesion of parts, fingers, toes, &c. where only one side was slightly inflamed, merely from their being placed in contiguity. Thus a truss applied to a rupture, will often produce adhesion, though the inflammation is inconsiderable.

INDEPENDENTLY of that pre-disposition to diseases which lurks in the habits of individuals, and constitutes their idiosyncracy,

inflammation may arise in three ways; from bruises and irritations in which functions are impaired, or destroyed, or suspended. Among these causes, pressure holds an elevated station, not only because it is frequently the instrument of mischief, but as also, one of the most powerful means of restoration and cure, if skilfully applied. When the injury in the case of an artery be such as to puncture or divide its coats, the consideration then becomes different; for the hemorrhage must be stopped, even before the inflammation be taken into the account. But the discharge of blood from a ruptured artery, can be only stopped by compression, or by aiding that power which the artery itself possesses in its own nature, and which tends to the spontaneous suppression of the hemorrhage. What this power is, we shall now endeavour to investigate.

Mr. PETIT was of opinion, that hemorrhage is suppressed by the formation of a clot of blood, adhering to the interior surface of the vessel, which serves it as a mould, and this clot lying upon the mouth of the artery, like a cover, is united to the clot within. This piece of coagulum, supported by a compress, he thinks sufficient to resist the impetus of the blood, and to prevent the bleeding of the artery.

Mr. POUTEAU rejected Mr. Petit's doctrine of coagulum being the chief cause of suppressing the hemorrhage of divided

arteries, and considered that the swelling of the cellular membrane round the divided part, pressing upon the vessel, was of itself sufficient to restrain the bleeding.

Mr. KIRKLAND was of opinion, that hemorrhage was stopped and arteries closed by the natural contraction of arteries themselves.

Mr. JOHN BELL says, when hemorrhage stops of its own accord, it is not from any of the above causes, but from the cellular membrane being injected with blood; this blood coagulates, and that slight barrier is sufficient to restrain the bleeding of a small artery, till the parts inflame and the bleeding is entirely stopped.

DOCTOR JONES, by accurate experiments, clearly proves, that hemorrhage is not stopped by any one of the above causes alone, but from the effect of many of them, or perhaps all, in addition to the effusion of coagulable lymph, which appears to have the most permanent effect in preventing the bleeding of divided or punctured arteries. I shall quote this author's opinion in his own words, and relate some of the experiments which he adduces to support the truth of his hypothesis.

"AN impetuous flow of blood, a sudden and forcible retraction of the artery within its sheath, and a slight contraction of

its extremity, are the immediate and almost simultaneous effects of its division. The natural impulse, however, with which the blood is driven on, in some measure counteracts the retraction, and resists the contraction of the artery. The blood is effused into the cellular substance between the artery and its sheath, and passing through that canal of the sheath which had been formed by the retraction of the artery, flows freely externally, or is extravasated into the surrounding cellular membrane, in proportion to the open or confined state of the external wound. The retracting artery leaves the internal surface of the sheath uneven, by lacerating or stretching the cellular fibres that connected them. These fibres entangle the blood as it flows, and thus the foundation is laid for the formation of a coagulum at the mouth of the artery, and which appears to be completed by the blood, as it passes through this canal of the sheath, gradually adhering and coagulating around its internal surface, till it completely fills it up from the circumference to the centre.

A CERTAIN degree of obstruction to the hæmorrhage, which results from the effusion of blood into the surrounding cellular membrane, and between the artery and its sheath, but particularly the diminished force, and velocity of the circulation, occasioned by the hæmorrhage, and the speedy coagulation of the blood, which is a well known consequence of such diminished action of the vascular system, most essentially contribute to the accomplishment of this important and desirable effect.

A COAGULUM then, formed at the mouth of the artery, and within its sheath, and which I have distinguished in the experiments by the name of the external coagulum, presents the first complete barrier to the effusion of blood. This coagulum, viewed externally, appears like a continuation of the artery; but on cutting open the artery, its termination can be distinguished, with the coagulum completely shutting up its mouth, and inclosed in its sheath. The mouth of the artery being no longer pervious, nor a collateral branch very near it, the blood just within it is at rest, coagulates, and forms in general a slender conical coagulum, which neither fills up the canal of the artery, nor adheres to its sides, except by a small portion of the circumference of its base, which lies near the extremity of the vessel. This coagulum is distinct from the former, and I have called it the internal coagulum.

IN the mean time, the cut extremity of the artery inflames, and the vasa vasorum pour out lymph, which is prevented escaping by the external coagulum.

THIS lymph fills up the extremity of the artery, is situated between the internal and external coagula of blood, is somewhat intermingled with them, or adheres to them, and is firmly united all round to the internal coat of the artery.

THE permanent suppression of the hæmorrhage chiefly depends on this coagulum of lymph; but while it is forming

within, the extremity of the artery is farther secured by a gradual contraction which it undergoes, and by an effusion of lymph between its tunics, and into the cellular membrane surrounding it; in consequence of which these parts become thickened, and so completely incorporated with each other, that it is impossible to distinguish one from the other: thus, not only is the canal of the artery obliterated, but its extremity also is completely effaced, and blended with the surrounding parts.

EXPERIMENT I.—*Aug. 6, 1803.* A considerable portion of the right carotid artery of a dog was laid bare, and three ligatures were applied round it, close to each other, so as to cover nearly a quarter of an inch of the artery. The ligatures were drawn tight enough to cut through the internal and middle coats of the artery, and then by means of a piece of small twine, which had been laid along the artery, and on which the knots of the ligatures had been made, were carefully removed, so as not at all to injure the artery. Dr. Farre, who assisted me in this experiment, and myself then observed the artery, until we were convinced that the circulation through it was perfectly restored; and the only extraordinary appearance which we observed on the artery, was a slight impression made on its external surface by the ligatures. The external wound was then sewed up.

Aug. 9. The animal died this evening, in consequence of profuse secondary haemorrhage from one of his femoral arteries, on which an experiment had been performed.

DISSECTION. On cutting away the ligatures in the integuments covering the carotid, we found a quantity of thin pus in the wound, extending down to the artery, which was covered and surrounded by a very thick layer of lymph, not only at the part where the ligatures had been applied, but also about an inch below, and an inch and a half above. In proceeding to cut open the artery, I only expected to find its internal and middle coat cicatrized, and its canal more or less completely pervious; but to my great astonishment, it was completely obstructed and filled up with lymph, which not only adhered to, but appeared to form one substance with the parietes of the artery. The lymph at each of its extremities appeared rather of a dark red colour, in consequence of the adhesion of some red particles.

IN consequence of my leaving Edinburgh soon after this experiment had been performed, I had no opportunity of repeating it for many months; at length, however, I obtained permission to perform it on a horse which had been sent to a slaughterer.

EXPERIMENT II.—*January 24, 1804.* The carotid artery of a horse was laid bare, and four ligatures were applied around it, and then removed, as in the first experiment. Dr. Farre assisted me in this experiment also, and we took care to be fully convinced that the circulation was complete through the artery before the external wound was sewed up.

January 27. The animal was killed. The ligatures with which the integuments had been sewed up still secured them; but from the depending situation of the parts, there was a considerable cavity between the integuments and muscles.

THERE was a small quantity of pus over and behind the artery, which was surrounded by a very considerable effusion of lymph. On cutting open the artery at its extremity next the heart, we very soon came to a long coagulum of blood, which filled up its canal, but did not adhere to its internal surface. At the extremity of this coagulum, a projecting portion of lymph cohered and indented it. Continuing to cut open the artery, the projecting lymph was only the extremity of a portion, which completely filled up its canal for the space of about half an inch, and adhered so intimately to the internal surface of the artery, as to form but one substance with it. This lymph had on it four transverse lines, which seemed to mark where the ligatures had been applied. The other extremity of

the lymph, or that next the head, also projected a little beyond the part at which it adhered to the internal surface of the artery: attached to this lymph we found a very long coagulum of blood, which appeared to fill up the canal of the artery, but did not adhere to its internal surface.

EXPERIMENT V.—*February 16, 1804.* A small portion of the carotid artery of a horse was laid bare, and two ligatures were applied around it, about one eighth of an inch from each other, in the manner, and with the view, described in experiments 1 and 2. The ligatures were then cut away, and the integuments sewed up.

February 19. The animal was killed. The canal of the artery was completely obstructed at the part on which the ligatures had been applied; and on cutting it open, at some distance from the obstructed part, but between it and the heart, we found a considerable coagulum of blood in this portion of its canal, and which being removed, to ascertain the nature of the obstruction, it was discovered that this portion of artery terminated in the same manner as arteries do on which a ligature has been applied and allowed to remain, i. e. in a conical impervious sac. The artery just beyond this point felt hard and solid, I therefore did not cut through its coat at this part, lest I should spoil the appearance I have just described, but pro-

ceeded to cut open the other portion of the artery between the head and the obstructed part, beginning at the extremity next the head. In this portion also we found a considerable coagulum of blood, which being removed, there appeared a small portion of lymph, of the form of a heart, projecting within the canal of the artery, the base situated next the coagulum of blood, the apex terminating in the obstructed part of the artery. Over the artery, and on each side of it, there was a considerable effusion of lymph, extending from rather more than an inch and a half below the obstructed part to nearly an inch and a half above it. The integuments, from the cause before mentioned, were not adhering to the internal surface of the wound; that surface was formed by a very thick layer of lymph, which was lubricated with pus, but there was not the slightest accumulation of pus in the wound; nor was there any about the artery; nor was there any pus discovered in any of the experiments, except the second and third, in which the loose portions of ligature were found. In the succeeding experiments I used small twine for a ligature, and was particularly careful to see that it was completely withdrawn."

FROM an examination of the reasoning of the authors above-mentioned, and the facts they advance, I was desirous of trying experiments to ascertain the effects of arterial compression, when employed with such force, as to excite inflammation of the

artery and of the parts surrounding it. In these experiments, I universally found coagulable lymph, not in the cavity of the vessel, but surrounding it, and effused into the coats of the artery, whose tube was so much contracted and pressed together, as to render it completely impervious to the passage of blood. The advantage of obstructing an arterial canal by this method, will be examined more at large, when we are treating of the effects of compression for the cure of aneurism.

EXPERIMENT I.—*Friday, Dec. 5, 1806.* A tourniquet was applied, and a pad fixed upon the left radial artery of a horse, and a wide wooden splint was fixed on the opposite side of the limb to prevent the circulation being interrupted in the collateral vessels. On the evening of the same day the limb was much swelled, but retained its natural heat. On the evening of Saturday the 6th, the tourniquet was removed until the middle of the following day, when it was again applied. By this time, the œdema and swelling of the limb had greatly increased, and the heat was much more than natural. The pressure was removed about eight o'clock on Tuesday, Dec. 9, and the animal was killed at two the same day.

UPON dissection, a great effusion of serum was found in the cellular membrane from the place where the tourniquet was applied, to the hoof. There was also a small effusion above the

Fig. 1st



Fig. 2nd



Effect of PRESSURE upon an
Irregular:

tourniquet. There was great inflammation of the cellular membrane, fascia, and muscles which lay underneath the pad of the tourniquet. The artery lay imbedded in a quantity of coagulable lymph, effused into the cellular substance surrounding the vessel. Externally it appeared inflamed. The muscles, &c. below appeared healthy, and had no marks of inflammation, except where pressed by the tourniquet. The upper part of the artery exhibited no signs of disease; but when an incision was made along it, an effusion of lymph was found in its internal coats, which swelled them to that degree as to obliterate the cavity by pressing its sides in contact with each other for the space of one inch and a half.*

EXPERIMENT II.—A tourniquet was applied in the same manner as in my first experiment, to the radial artery of a horse, on Tuesday, Dec. 16, 1806. The following day the limb became cedematous; at night the tourniquet was a little slackened, but in the morning of Thursday the 18th, it was again tightened, and continued so till Saturday the 20th; in the afternoon, the tourniquet was altogether removed. On Monday, Dec. 22, the animal was killed.

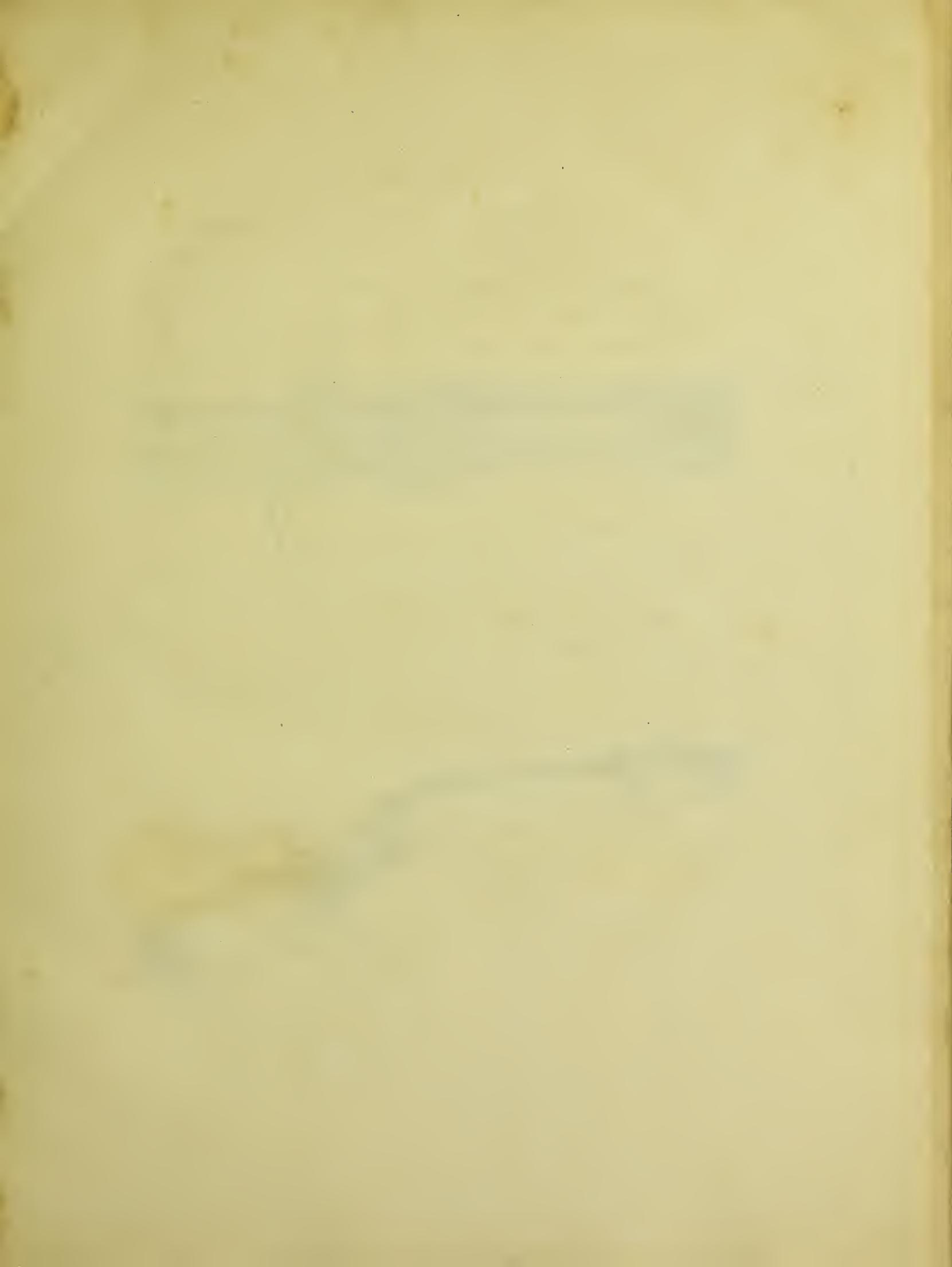
UPON dissection, there was not so much exudation of lymph below the compression, as in the former experiment. Around

* Vide plate the 1st.

the artery, there was much inflammation, but no inflammation of the artery itself. For two inches above and below the pad, it was so much diminished in its cavity as with much difficulty to admit of the introduction of a bristle, and immediately under the pad, a small plug of dark coloured coagulum was formed, below which, was a considerable protuberance in the coats of the vessel, impeding the passage of the blood. The obstruction was further increased by a great thickening of the coats of the artery, which had become almost of a cartilaginous texture.

THE diseases of arteries are of so dreadful a nature, that it is surprising how little has been written upon the subject; nor can we otherwise account for the silence of the profession upon this most material branch of surgery, but from considering their intricacy and obscurity, and the difficulty of attaining an accurate knowledge of them, by inspecting those dead bodies in which morbid affections of arteries may be supposed to have occasioned death,

ARTERIES, I suspect, are much more frequently the seat of diseases, than has been hitherto generally imagined. Their internal coats are subject to inflammations, which may either be of the adhesive, suppurative, or ulcerative kind. The first kind



DASEANAEAK'WAX,



is, if I may so express it, local, that is, confined to some particular spot in some particular artery, and arises from accidental causes, such as a rupture, incision, or bruise, and may be excited with great advantage for the cure of aneurism. The second and third are general affections of the arterial system, and are brought on by the common causes of general inflammation, such as cold, an increased action of the heart, and from a certain state of constitutional health.

I AM induced to believe, that arterial inflammation is one of the causes of dropsy; for on the dissection of bodies, in which the cellular membrane of the whole skin contained water, I have often found the internal coats of the great arteries inflamed; and the cure of anasarca, in one case, by drinking cold water plentifully and frequently, and in another by adopting the most decidedly antiphlogistic regimen, have fallen under my own observation.

THAT inflamed arteries also produce hydrothorax, I am convinced from reiterated experience, and the following case so clearly evinces it, that I have the less hesitation in bringing it forward.

THE annexed plate represents part of the iliac artery of a man who died of general dropsical affection, and on whose

dead body I practised the operation of aneurism, which it was then my intention to perform in the case of James McDonald, hereafter related. After having performed the operation on both sides, I removed the left iliac artery, and having brought it home, for the purpose of minutely examining it, I was much surprised to find that part of the artery which passes under Poupart's ligament so thin and transparent, that it could nearly be seen through. Immediately above this part, there was an evident contraction of the vessel, and above this contraction, a thickening and an effusion of coagulable lymph on the external coat; upon slitting up the artery, it was found much inflamed, and its internal coats ulcerated, as represented in the plate. On making enquiry concerning the symptoms of the disorder which had occasioned death, I found that the man was forty years of age, much habituated to drinking, had been subject for great part of his life to cough, had complained frequently of palpitation, or to use his own expression, "a fluttering about his heart, which would leap and jump that he could scarcely breathe," his face at those times became discoloured, and he suddenly fell down, and was, to all appearance, dead. About the middle of May last, symptoms of dropsy came on, his legs swelled, water collected in the abdomen, and he had a difficulty of breathing, for which he requested relief. Three grains of calomel were ordered at bedtime, and saline purges were given every other day for three times, then one

grain of digitalis every night and morning, which so far removed his complaints, that he was considered well by the middle of June. In August his disease returned, he frequently spit up a frothy matter, mixed with blood, occasionally made bloody urine, all the symptoms of the disease were aggravated, he rapidly became anasarcaous, and on the first of October he died.

It is worthy of remark, that this man had two brothers labouring under similar diseases with himself; one died of a dropsy, and the other from a rupture of the pulmonary vessels, and it is not unlikely that in all three, had I had the power of accurate examination, but that the arteries would have been found in a state of general inflammation, and that the pulmonary vessels would have resembled the iliac, here represented. Would it not, therefore, be proper, in cases of this kind, to try bleeding, diluents, and an antiphlogistic regimen, instead of the drastic purges, and stimulant diuretics commonly recommended? Whether the rupture of the internal coat of the artery, which is well expressed in the plate, and which lay immediately under Poupart's ligament, would have produced an aneurism, must be always doubtful; but from the contraction of the artery above the rupture, and from the deposit of coagulable lymph at this place, which is plainly seen upon the thickened external coat, I am inclined to believe, that nature was providing a remedy in the deposit of coagulable lymph in the exterior coat of the

artery, to obviate a disease produced by the suppurative inflammation of the internal one. This reasoning is founded on an hypothesis, the truth or error of which can only be determined by future observations and experiments; but it is desirable that nothing like a fact should pass unnoticed, I have therefore ventured to offer the above, for the consideration and judgment of those who may be inclined to pursue the investigation.

A PECULIAR disease is mentioned by Mr. Pott, in his remarks on amputation, and also by Mr. Burns, of Glasgow, in his dissertation on inflammation, which he calls "spongoid inflammation, or spongoid tumor." From cases of a similar kind, that have fallen under my own observation, I am inclined to class it among the diseases of the arterial system, and would call it, aneurism of the extreme arteries.

As this disease has generally proved fatal, under the most eminent surgeons and judicious treatment, and as there is a doubt, even, concerning its pathology, I shall insert the descriptions of Mr. Pott and Mr. Burns, and shall attempt to illustrate the subject further, by two or three cases, which have occurred in my own practice.

" THERE is (says Mr. Pott) another kind of complaint affecting the leg, removeable (as far as my experience goes)

by amputation only, which is one reason why I mention it in this place, and to which I might add another reason, which is, that it either derives its origin from a bursten artery, or at least is always accompanied by it.

" I KNOW no name to give it, or under what class to range it; but will describe it in the best manner I can.

" IT has its seat in the middle of the calf of the leg, or rather, more towards the upper part, under the gastrocnemius and soleus muscles: it begins by a small hard, deep-seated swelling, sometimes very painful, sometimes but little so, and only hindering the patient's exercises; it does not alter the natural colour of the skin, at least until it has attained a considerable size; it enlarges gradually, does not soften as it enlarges, but continues through the greatest parts of it incompressibly hard, and when it is got to a large size, it seems to contain a fluid, which may be felt towards the bottom, or resting, as it were, on the back part of the bones. If an opening be made for the discharge of this fluid, it must be made very deep, and through a strangely distempered mass. This fluid is generally small in quantity, and consists of a sanies mixed with grumous blood: the discharge produces very little diminution of the tumor, and in the few cases which I have seen, very high symptoms of irritation and inflammation have come on, and advancing with great rapidity,

and most exquisite pain, very soon destroy the patient, either by fever, which is high and unremitting, or by a mortification of the whole leg.

" IF amputation has not been performed, and the patient dies, after the tumor has been freely opened, the mortified and putrid state of the parts prevents all satisfactory examination; but if the limb was removed without any previous operation (and which, as far as my experience goes, is the only mode of preserving the patient's life) the arteria tibialis postica will be found to be enlarged, distempered, and burst, the muscles of the calf of the leg to have been converted into a strangely morbid mass, and the posterior part of both the tibia and the fibula more or less carious*."

" THIS disease (says Mr. Burns) begins with a small colourless tumor, which, if there be no thick covering over it, such as the fascia of a muscle, or the aponeurosis of the foot, is soft and elastic, but tense, if otherwise. It is at first free from uneasiness; but, by degrees, a sharp, acute pain darts occasionally through it, more and more frequently, until the sensation becomes continual. For a considerable time the tumor is smooth and even; but afterwards it projects irregularly in one or more points; and the skin at this place becomes of a livid

* Vide Pott's Works, vol. 3, p. 418.

red colour, and feels thinner. It here easily yields to pressure, but instantly bounds up again. Small openings now form in these projections, through which is discharged a thin bloody matter. Almost immediately after these tumors burst, a small fungus protrudes, like a papilla; and this rapidly increases both in breadth and height, and has exactly the appearance of a carcinomatous fungus, and frequently bleeds profusely. The matter is thin, and exceedingly fetid, and the pain becomes of the smarting kind. The integuments, for a little around these ulcers, are red and tender. After ulceration takes place, the neighbouring glands swell, and assume exactly the spongy qualities of the primary tumor. If the patient still survive the disease in its present advanced progress, similar tumors form in other parts of the body, and the patient dies hectic.

"ON examining the parts affected after death, or amputation, the tumor itself is found to consist of a soft substance, somewhat like the brain, of a greyish colour, and greasy appearance, with thin membranous-looking divisions running through it, and cells or abscesses in different places, containing a thin bloody matter, occasionally in very considerable quantity. There does not seem uniformly to be any entire cyst surrounding the tumor, for it often dives down betwixt the muscles or down to the bone, to which it often appears to adhere. The neighbouring muscles are of a pale colour, and lose their fibrous appearance, becoming more like liver than muscle. The bones are uniformly

carious when in the vicinity of these tumors. If large, they are found rough, and broken off into fragments; if small, they are generally soft and porous. The tumor is sometimes caused by external violence; but often it appears without any evident cause.

"I KNOW of no remedy which has the power of checking the progress of the complaint, or removing it. Friction, with anodyne balsams, sometimes gives relief in the early stages, but does not seem to retard the progress of the disease. Extirpation is the only remedy which has a prospect of being successful, but it is only adviseable in the early stages, whilst the disease is entirely local, and has not extended to the neighbouring glands; for after they become affected, the chance of recovery is greatly diminished. It is, however, sometimes difficult to persuade patients at this time to submit to extirpation, or amputation, because the pain and inconveniences are not considerable; but the operation ought to be urged with all the eagerness which a conviction of its absolute necessity, and its precarious issue, if delayed, will inspire.

"I HAVE named this disease spongoid inflammation, from that spongy elastic feel which peculiarly characterizes the disease, and which continues even after ulceration takes place*."

* Vide Burn's Dissertation on Inflammation.

MR. HEY, of Leeds, has lately published cases, probably of the same kind, under the name of "Fungus Hæmatodes*," for which I shall refer to his able practical work, and shall now proceed to relate those which have fallen under my own observation.

JOHN JONES was admitted into the Birmingham Hospital with a considerable enlargement of the left fore arm. Six weeks before his admission, it had been bruised by the fall of some gravel, which gave him very little pain at the time, and after a few days, the effects of the injury seemed removed. But in the course of three weeks, the arm swelled, and he felt a beating and throbbing in it, attended with considerable pain, which led him to apply for assistance to one of those female empirics, well known in most towns by the mischief they inflict on the ignorant and the poor: the old woman considering it as an abscess proper to be opened, plunged a lancet into the tumor, and a very profuse bleeding ensued, but immediately applying lint to the wound, and binding it up tightly, the hemorrhage was restrained. In this state he continued some days, when the throbbing and pain returned, the wound opened, and the bleeding recurred every second or third day, till he was admitted under my care. When I first saw him, the whole of the fore arm was found considerably enlarged, without any discolouration, except where

* Hey's Practical Observations in Surgery.

the puncture was made; and a peculiar sensation was observable throughout the whole of the tumor, that gave me the idea of a deep-seated pulsation. The case was involved in much doubt: it was considered an aneurism of the interosseal artery, and accordingly having secured the humeral artery by the tourniquet, an incision was made in the direction of the flexor muscles. A profuse hemorrhage ensued, which was with difficulty restrained by screwing the tourniquet: a large quantity of coagulum was found organized, and interspersed with bony concretions, contained in a variety of sacs formed between, and in the body of the muscles themselves, many of which could not be distinguished from the disease. Underneath this mass, the bones, both radius and ulna, were so much diseased, that amputation above the elbow was deemed the only remedy.

AFTER removing the limb, the stump had a very florid, but healthy appearance; the humeral artery, with five muscular branches, were taken up, and the stump dressed in the usual way; the cure went on favourably, and the patient was discharged, "cured," in three weeks.

Two months afterwards, the man applied again for relief, having had frequent bleeding from small orifices upon the side and fore part of the stump; these made their appearance in small black specks, bled profusely, but stopped of their own

accord. He was again admitted into the Hospital, the stump was dressed with mild cerate, a gentle pressure was made by a roller, and the wounds soon healed. The roller was continued. In the course of a week he was seized with violent hemorrhage from the lungs, for which he took diluted sulphuric acid three or four times a day, and lived on a milk diet.

FOR three weeks he was apparently recovering, when the specks appeared again upon the stump, and notwithstanding the pressure made by the roller, they gave way, and a violent bleeding suddenly ensued, which stopped of itself before any assistance could be afforded. He was very much weakened by this hemorrhage, and his pulse remained very slow and feeble for some days. His health, however, began to recruit; but before he was recovered, the hemoptoe returned. Ten ounces of blood were then taken from his arm, and fifteen drops of tincture of digitalis were given, twice a day. From this time he had no return of hemorrhage while he remained in the Hospital, which was about five weeks: upon leaving it he was advised to go into the country, where he died consumptive in a few months. I was not informed of his death at the time, which prevented my making any examination of the body.

MINUTELY examining the amputated arm, a large quantity of coagulated blood was found in a variety of sacs formed in

and among the muscles. This coagulum was organized, and numerous well-injected vessels were perceived passing through it, in all directions. The ulnar, radial, and interosseal arteries, with several of their branches, were all sound, but appeared much enlarged; their coats were covered with thick and strong layers of coagulable lymph. The radius and ulna were both found in a carious state, and nearly dissolved at their centre by the blood with which they were surrounded.

RICHARD TAYLOR, aged twelve years, of a thin, delicate constitution, and weak, scrofulous habit, about six weeks before Christmas first perceived a swelling upon the outside of his right leg, beginning about an inch below the knee and extending beyond the calf of the leg. Its increase was gradual, elevating the external parts into one uniform tumor. It was attended with intense pain, but without any external discolouration. He did not recollect having received any injury near the part, though it is probable such an accident may have occurred.

IN this stage, poultices and embrocations were used, but without good effect. A caustic also was applied, but without advantage. Upon puncturing it with a lancet, a quantity of florid blood was discharged. The tumor increased daily, and when admitted into the Birmingham General Hospital in February, 1806, it was in size equal to the head of a new-born infant.

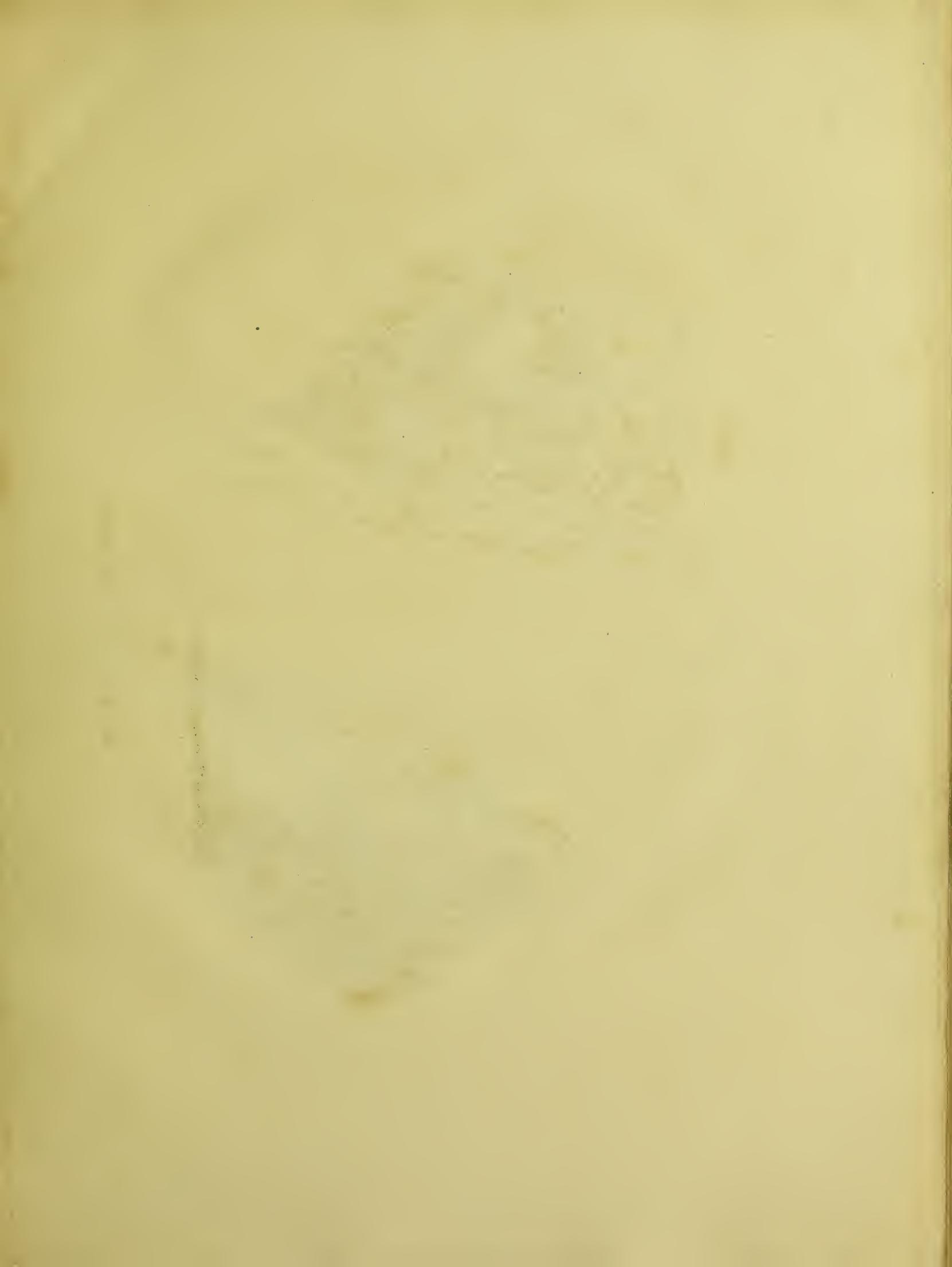


Fig. 2nd

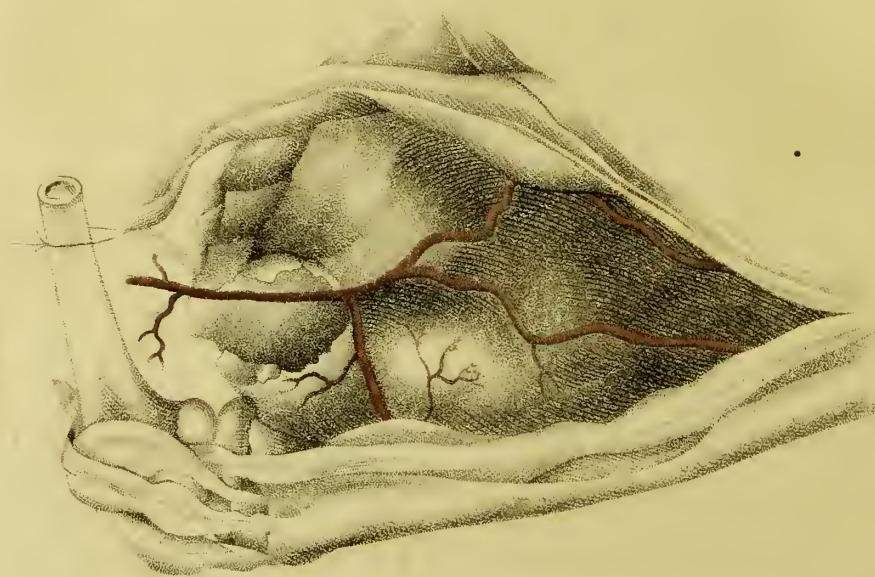
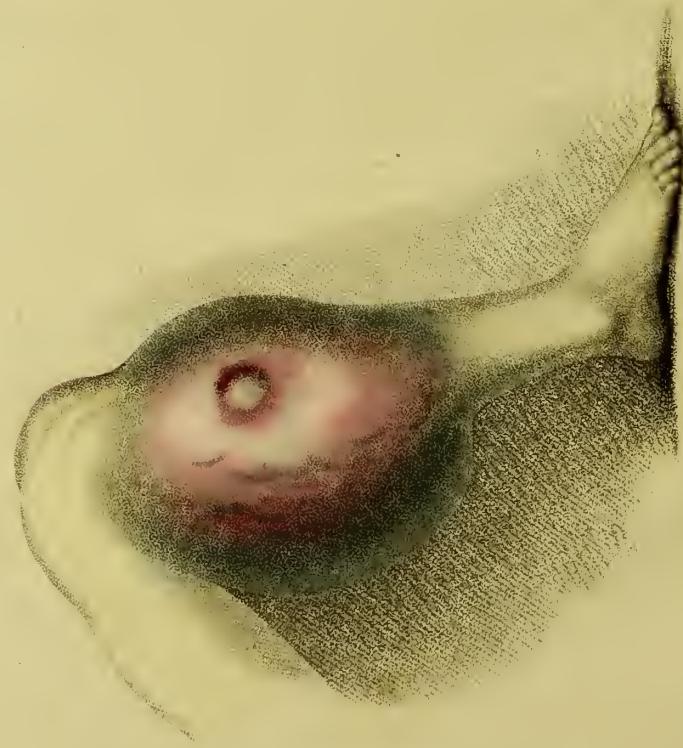


Fig. 1st



FIGURES
H. E. M. J. D. D. E. S.

Its origin upwards was from the head of the gastrocnemius, and extended below the belly of that muscle. It was firmly attached to the neighbouring solids. The limb preserved its natural colour, though the apex of the tumor was much inflamed, and its sides covered with varicose veins*. The sensation remained entire in the lower part of the limb, and the pulse at the ankle was perfect. Sometimes the boy complained of pain in certain parts of the tumor, at other times it would be totally insensible. In the lower part fluctuation was imperfectly perceived, but the upper had a hard carcinomatous feel. The true nature of the disease was involved in much obscurity. A large poultice was applied, which rendered the parts softer, and the whole tumor appeared as if coming to suppuration, increasing much in size and pain.

ABOUT a fortnight had elapsed, when a small tubercle appeared on the centre of the tumor; a few small pustules were often brought out by the poultice, which supplicated and discharged a quantity of thin matter, mixed with much blood. The hardness and pain increased with lividness, and seemed to indicate something scirrhouus; the patient's habit of body led some to think it a mere scrofulous abscess; others thought it partly scrofulous and partly caneerous. The existence of aneurism was probable; but there was no evident pulsation, and the heat and

* Plate 3, fig. 1.

sense of the limb remained as usual. The hardness to the touch rendered it probable that aneurism might be attended with considerable ossification, and this might preclude the characteristic symptoms of that disease. At any rate, it was a doubtful and a dangerous case, and the health of the patient daily declining, it seemed necessary that some investigation should decide its nature and the method of cure. It was proposed, therefore, that an incision should be made into the body of the tumor. The circulation in the femoral artery being previously secured by the tourniquet, on the 25th of March, 1806, an incision was made, and immediately a quantity of florid blood, mixed with much coagulum, was discharged. When examined by the finger through the orifice, extensive ossifications, with the total destruction of the head of the fibula, were distinctly perceived. Amputation, therefore, remained the only resource, and was accordingly performed.

ON dissection of the amputated limb, the sac was found of an aponeurotic texture, derived from the periosteum both above and below, the vessels of which still continued to pour out ossific matter, modelling it into innumerable honeycomb-like cells, lining the internal surface of the sac. The contents were a quantity of organized coagulum, connected to the sac by many fibres, or rather vessels, which were distributed very copiously into the mass of coagulum, depositing here

and there, an osseous matter, which in some places was accumulated to the size of a pea, in pieces of an angular shape, white, and of a substance completely bony and hard, in others it was of a texture resembling cartilage, pliable, and not so hard. The fibula was entirely dissolved for the space of three inches, and the muscles seated on the outside of the leg were destroyed near the disease, so far, as to leave only part of their substance forming the walls of the sac.

THE popliteal artery was sound, and at the usual place of bifurcation divided into the tibialis posticus and anticus, the anticus went through the leg upon the posterior part of the sac, without any interruption in its course, and without sending any branch into the tumor. Having arrived at the fore part of the leg, it gave off its branches in the usual manner, and continued sound all through the foot. The posterior tibial artery was completely sound, and having gone round close to the body of the sac, gave off the fibular artery, which was natural in its course and uninterrupted. The tibial artery also went off in the usual manner, nor from any of the arteries could a branch be discovered which furnished the disease*.

IT will be perceived that the above cases, in some respects, very much resemble the description given by Mr. Pott†. Yet so far as that description relates to the arteria tibialis postica

* Plate 3, fig. 2. † Pott, vol. 3, p. 418.

being found "enlarged, distempered, and burst," there is no resemblance to the cases before us. For here, the limbs were minutely injected and accurately examined, and all the larger arteries were sound, and the disease seems to have arisen from a dilatation and rupture of some of the *finer* vessels only.

THOMAS ARCHER, a stout, robust, young man, about thirty years of age, and of a full plethoric habit, was attacked immediately after an inflammatory fever, with stiffness and throbbing pain in the orbit of the eye; the pain rapidly increased, and in a few days the eye was protruded, and supplicated. Bread and milk poultice, and other mild applications were used; calomel and hemlock were given internally, and hemlock was applied to the part. However, large doses of opium alone gave him relief. The tumor daily increased, very minute vessels ramifying over its surface, and in two months was nineteen inches in circumference; astringents and escharotics were then applied, but their effects were so painful, that they could not be continued. Repeated hemorrhages at this time, gave him some ease. These were so frequent and so profuse, and were restrained with so much difficulty, that his health gradually gave way, dropsical symptoms came on, of which in a short time he died. Annexed is an engraving of the tumor; situated in the centre is the largest vessel, and the part from whence the hemorrhage chiefly took place*.

* Plate 4.



FUNGS HEMATOIDES.

IT may be asked, of what nature was this disease? Certainly it was not cancerous; for the tumor was never hard, and no offensive discharge as to smell, issued from it. It was not the effect of mere inflammation, for it received no relief from the usual applications, and after it came to a crisis by suppuration, the disease was not removed. But it is not to be doubted that the arterial system of the eye was the chief seat of the disease: for the hemorrhage, swelling, and pain were the most marked symptoms. From some latent cause, then, we may suspect the arteries to be affected: the cellular membrane surrounding them giving way in all directions, the arteries were elongated, as the cellular texture was stretched out, and incapable of bearing elongation beyond a certain extent, they burst, and hence those occasional hemorrhages which marked the progress of the disease.

THERE is another disease of arteries, which, so far as my observation and recollection serve me, had not been accurately noticed, till Mr. John Bell favoured the public with his account of aneurism of anastomosis. The particulars of this disease have been so minutely detailed by Mr. Bell*, that little remains for future practitioners to say on the subject. I therefore shall only give a short description, illustrated by two successful cases, which will afford some additional weight to the practice he recommends.

* Bell's Principles of Surgery, vol. 1, p. 456.

IN the cases which have fallen under my observation, the tumor has arisen without any preceding hurt, or known cause. A small soft tumor made its appearance, containing a fluid, which could be displaced by pressure; but upon removing the pressure, it was instantly filled again. It was attended with throbbing, but not with pain. These tumors, if suffered to remain, gradually increase, and eventually burst, bleed profusely, and if not totally removed, very soon destroy the patient by repeated bleedings.

I WAS consulted in 1803, for a young gentleman, who had a soft tumor situated within the mouth, between the gums and the cheek, and extending from the angle of the mouth to the last dentes molares; it was compressible, but instantly filled, when the pressure was removed, had a throbbing sensation, and a slight pulsation could be felt; the tumor, from the size of a pea when first observed, gradually increased for two years, and in this time was become about the size of a walnut. I did not hesitate to advise its complete removal, which I thought might be successfully accomplished. But as this case had occupied the attention of some of the first surgeons of Edinburgh, who differed in their opinion as to the possibility of completely removing the whole, he was taken to London, where, unfortunately, the opinion of the most eminent surgeons still varied: and had it not been for the decided judgment of his learned relation, a

physician of eminence, probably the young man would by this time, have fallen a sacrifice to the disease. He, however, strongly supported my opinion, and allowed me to perform the operation, and the tumor was completely dissected away. A part of the lip, which was necessarily divided, was brought together by the assistance of harelip pins, and the patient soon recovered. It is now four years since the operation, and he has not had the least return.

UPON examining the tumor, I found it to consist of a convoluted vessel contained within a sac; one large vessel entered the sac at one extremity, and after making innumerable convolutions, came out at the other; within the external sac were contained a variety of small saccules, which were connected with the artery, kept dilated with blood, and were constantly increasing. Having completely removed the tumor, and without a puncture, I was enabled to inject it with quicksilver, which accurately displays its structure.

SINCE performing the above operation, another case has occurred in my practice, in which I performed the operation; it has been attended with like success, and was in all respects so similar to the last described, that I think it unnecessary to relate it.

VARICOUS ANEURISM.—Another aneurismal disease, complicated with puncture of a neighbouring vein, was first noticed by Dr. Hunter in the first volume of the Medical Observations and Inquiries, and afterwards fully illustrated in the second. It has occurred, in all the cases hitherto recorded, in the basilic vein being wounded through in the operation of bleeding, and the adjacent artery being wounded at the same time, the blood passes immediately from the artery into the vein. This injury is distinguished by some marked symptoms: when the skin is healed, the vein will be dilated, and it will have a pulsatile jarring motion, on account of the stream of blood passing from the artery into the vein, and will make a hissing noise, which will be found to correspond with the pulse; a tumor gradually forms, which remains stationary, and if not meddled with, does little or no mischief to health. Dr. Hunter has given two cases of this disease in the Medical Observations and Inquiries, vol. 2, p. 396, &c. and Dr. Cleghorn another, in vol. 3, p. 110. The following is a case of the same kind:

A LABOURING man in the year 1793 was bled in the arm unskillfully, the lancet passing through the vein having punctured the artery. From the jetting of the blood, the operator was immediately sensible of the error, and after taking away a sufficient quantity of blood, bound up the wound very tight, and sent for a surgeon of eminence, who finding that no blood

escaped through the bandage, did not open the dressing, but gave directions that the man should be kept perfectly quiet, and the bandage not removed on any account. The patient soon recovering from the indisposition for which he was bled, found the pressure irksome, and removed it; the puncture was healed, but a small tumor, about the size of a pea, was perceived, in which could be discerned a thrilling sensation. The bandage and quietness were again recommended. The patient finding no inconvenience from the swelling, refused to submit to any plan, and went about his business. In the course of six months he came to the hospital, the tumor was then as large as a filbert, and the thrilling sensation above described was readily felt, and the jet of blood passing from the artery to the vein was evidently perceived. The tumor had not grown larger during the last four months, and the patient suffered no inconvenience from this aneurism, except the arm being a little weaker than the other. It was therefore the opinion of the surgeons, that no mode of cure should be attempted. I saw this man many years afterwards, and the tumor remained just in the same state.

WE now come to speak of aneurism, a disease by far the most frequent to which arteries are subject, and which usually has been divided into two kinds, the one called true, and thought to consist of a mere dilatation of the artery; the other spurious, arising from the bursting or puncture of an artery, where the blood passed into the neighbouring cellular membrane and surrounding parts*.

As the truth or falsehood of theory, in this instance, must have a great influence upon practice, I shall endeavour to determine in what a true aneurism consists. In the first place, are all aneurisms formed, according to the opinion of Senac, from the action of the heart upon those parts of arteries which have the least power of resistance, *merely* by dilatation, or is the muscular coat of the artery always torn, before the aneurism is formed? That there may be great dilatations of the arterial system and of the heart, without local aneurism, I believe I may assert without danger of contradiction. Several of the cases of Morgagni, Lieutaud and

* A true aneurism has always a pulsation more or less, and is formed by a *dilatation only* of the artery, either all around or on one side of it, much in the same manner as those analogous tumors of the veins are formed which we call varices. But the spurious aneurism is when the artery, being opened by a puncture, wound, contusion, erosion, or other external violence, extravasates the blood betwixt the muscles and integuments, the limb itself appearing livid, and much swelled thereby.—Heister's Surgery, part 2, page 290.

Senac were only of this kind. The aorta in one of the cases of Senac*, from its rise to the diaphragm, was all the way the bigness of a man's head. In such a case, it is not likely that there was a partial rupture, for no sac was formed, and yet no pathologist would hesitate to call this disease aneurism.

WHEN earthy concretions are formed in the coats of arteries, there is frequently an unequal action, and consequent partial dilatation of the artery, without rupture. I believe that this may be the case from instances which have fallen under my own observation, where I have had no opportunity of examining the dead body.

Mr. M. four years ago was seized with violent local pains of the back, which yielded reluctantly to the antiphlogistic plan. Six months afterwards he was seized with a strong pulsation felt above the navel, which was considered by all about him, as an aneurismal affection of the aorta. This continued nearly two years, when a pulsation was observed just above the right clavicle, near its union with the sternum. The pulsation in the belly gradually declined as that of the chest increased, and it

* J'ai vu un homme qui avoit de violentes palpitations; elles se faisoient sentir au côté gauche sous les côtes, et elles étoient accompagnées de douleurs extrêmement vives. La cause de ces accidents étoit dans la crosse de l'aorte; ce vaisseau depuis son origine jusqu'au diaphragme étoit plus gros que la tête; mais le volume du cœur n'étoit presque pas sorti de son état naturel.—Traité de la Structure du Cœur, liv. 4, ch. 8, p. 407.

continued to decrease, and at this time has entirely ceased, a large aneurismal tumor having formed meanwhile, thrusting out the top of the sternum, and both ends of the clavicles. In this case no doubt can be entertained of an aneurismal dilatation of the aorta in the abdomen, and it has yielded to a dilatation of the aorta in the chest. Shall we suppose then, that the aorta was ruptured in both places, and thus gave rise to the disease? In the abdomen, I think, we should not be warranted in this opinion by the symptoms not continuing, which they must have done, had the muscular coat of the artery been ruptured. If then it was a dilatation of the coats of the artery in the abdomen, without rupture, the same may be supposed in the chest, where this disease still continues, though now probably approaching its termination.

BUT though there may occur cases of original dilatation of arteries without rupture of their muscular coat, by far the greatest number of aneurisms, I believe, arises from this cause. I have never yet seen an aneurism of the extremities which I did not imagine could be traced to some violent impulsion, which might injure the coats of the artery and produce rupture. In the case of Knight*, where popliteal aneurism was cured under the care of Mr. Mynors, by compression, the disease was clearly traced to his jumping from a very high coach. In the case of Ann Bolton*, the aorta was dilated all

* These cases will be related hereafter.

around to the extent of half an inch beyond its usual size; but on the upper side, where it probably began, a sac formed, which more properly constituted the aneurism, the muscular coat of the vessel having given way, and the exterior coat not being ruptured at the same time, gave rise to the formation of the aneurismal tumor, properly so called. But granting that the rupture of the muscular coat of the vessel, is the most frequent cause of aneurism, it is my opinion that this is not all. By violence, the most healthy person may be exposed to aneurism; yet this will not account for the frequent occurrence of the disease. I must therefore still appeal to a peculiar constitution of arteries, which predisposes them to rupture, even supposing rupture to be the most general proximate cause of the aneurismal tumor.

I HAVE already in the foregoing pages given cases and dissections, in which it is proved that an inflammatory state of the internal coat of the arteries was going on. May not then some idiosyncrasy predisposing to inflammation and ulceration, be the remote cause of that debility of fibre, which leads to the rupture of the muscular coat in arteries, and to the consequent aneurism?

ANEURISM, taking these reasonings for granted, is a disease of arteries in which their muscular coat sometimes is dilated

alone. But in general it is ruptured, and then forms a sac, bulging out from the ruptured portion of the coat, and gradually dilates all the other coats from the active pulsation of the artery itself: the sac during the progress of the disease being filled by a deposition of coagulable lymph, and the deposition going on, till some vital function is interrupted, or the sac being no longer capable of dilatation, bursts. If this definition or description of aneurism be allowed, it does not admit of that distinction with which we set out, of aneurismal disease being divided into true and false; for it is always a disease *sui generis*, whether the weakness of the arterial fibres be such as to dilate without rupture, or, which is most frequent, to rupture, and form an aneurismal sac.

ANEURISM is a disease of every part of the arterial system, and is observed most frequently in the aorta*, next in the carotids and other large branches of the aorta, afterwards in the extremities. It is even formed in the brain itself, where nature has taken such particular care to provide against sudden intrusions of blood. Morgagni relates the case of a man who died apoplectic, in the left hemisphere of whose brain was found an aneurismal sact; and Dr. Gilbert Blane has given an account

* Morgagni adversaria, annot. 11, animadversio xli.

† But from the abdomen and thorax I come at length, as you expect, to the brain, and here the right hemisphere discovered an extravasation of blood, begun under the pia mater at that part where it is contiguous to the left hemisphere anteriorly: the

in the Medical and Chirurgical Transactions, of a lady, who, five years before her death, in the sixty-fourth year of her age, was suddenly seized with a fit of giddiness and dimness of sight, succeeded by acute pain in the forehead, which symptoms she was subject to at intervals as long as she lived. About sixteen months before her death, she betrayed signs of mental derangement, which continued with occasional intermissions till her death.

"UPON examining the body, there was no appearance in the brain itself that could in any way account for the symptoms. There was indeed a greater quantity of fluid than common in the ventricles, and the surface of it was moister than is usually found in a sound state. There were also spicula of bone in the membrane forming the falx. The inner substance of the crura cerebri was of a brown colour, and more tender than natural; the optic nerves were smaller than natural, as if they had been

vessels were also more turgid than in the left, yet in this left hemisphere a great cavern lay hid, formed internally almost in the middle of its substance, and hollowed out from the medullary part longitudinally; which cavern was full of the most black and half concreted blood, and for this reason the vessels of that side were less turgid than the other. The parietes of this cavity were not only here and there lacerated, but also opened through the body of the corpus striatum into the left ventricle, by a foramen big enough to admit the point of a finger; and by this passage much bloody serum seemed to have escaped, which had filled both the left and the right ventricle, the septum lucidum being broken through. However, the fornix and the plexus choroides were sound; but the vessels of the cerebellum were likewise very turgid on the left side.—Morgagni, letter 3, art. 4.

wasted; the septum lucidum was more than usually dense; but the morbid appearance in this case, which was so singular, and to which the symptoms of complaint seem chiefly referrible, was two bulbs, about five eighths of an inch in diameter, filling up the hollow on each side of the sella turcica, which were evidently dilatations of the carotid arteries, and from their being filled with laminæ of coagulated blood, there could be no doubt of their being aneurisms of these arteries. The dissection was made by Mr. Hunter, assisted by Mr. Home, in the presence of Dr. Jenner and myself, and all concurred in opinion, that these tumors were aneurisms. The one on the left side was the largest; that on the right side communicated with the cavity of the artery, which was not the case with the other."

WHEN this disease occurs in the extremities, it is always distinguishable by the continual pulsation within the tumor, and by the length of time necessary for its progress.

ABSCESSES may be mistaken for aneurism, when the time of their formation and coming to a crisis is not watched. Scarcely ever can there be room to doubt, when due attention is paid to the order of symptoms, and of their occurrence. Aneurisms in their progress give great pain, but the pain is more relative to the distribution of cutaneous nerves, than confined to the aneurismal tumor; whereas the throbbing pain of abscess is

confined to the tumor. The pain and redness which attend aneurisms, when the distention of parts has arrived near its utmost, may be compared to those of abscess; but at this period of the disease, the pulsation will be so great as to remove every doubt. The stopping of pulsation by compressing the artery between the heart and the tumor, is the chief criterion of aneurism of the extremities, and the terrible pulsation of the aneurism of the aorta makes itself too evident when this great vessel is the seat of disease. Of the other symptoms which attend aneurism, there are few, characteristic of this disease alone. Syncope and vertigo are very frequent symptoms. Languor and debility generally attend it, and sometimes life is consumed by atrophy, and the body wastes away before aneurism of the aorta comes to its termination, either by bursting, or by compression of the passages of the stomach or of the lungs.

THIS was the case with my patient George Sutton, a labouring bricklayer, fifty years of age, who, after a violent blow on the chest, had an aneurism of the aorta. He was admitted an out-patient of the Hospital in 1804. At that time the external swelling was about the size of a pigeon's egg, he had frequent pains in the part, which extended down the abdomen and to the arms and neck, the pulsation was violent, attended with great anxiety and distress: he was occasionally bled, took digitalis and opium as necessity required, and the antiphlogistic plan

was pursued. The disease, however, gradually gained ground; and after three years he died, wasted away by the effects of the disease.

FOR the cure of aneurism, generally, there are few, if any medicaments, which I can offer with confidence, as, unfortunately, neither nature nor art have yet furnished us with the aneurismal specific. There are, however, various means proposed: some directed to the regulation and diminution of the circulation; others to the state of the digestive functions, and many to the increase of constitutional strength.

"CÆTERUM si (says De Haen) utcumque medicabile malum, est humorum repetitæ evacuationes, spones acidi, ut tamarindus, variorum fructuum acido saponaceorum rob dicta. Nitrum copiosum, tremor tartari; et quia id hominum genus spasmis admodum torqueri solet gummi ferulacea, et opium; diæta cæterum blanda ex jure carnium tenuiore, carnibus tenerioribus, fructibus horæis oleribus saponaceis tum denique magna animi corporisque quies; calamitosum hunc morbum ad tempus notable, sæpe etiam per annos tolerabilem reddunt." De Haen, tom. 1, p. 257.

IN addition to these, digitalis may be ranked among the most powerful of those agents which lessen the irritability of the

heart and arteries, and perhaps of the whole vital system. In case of internal aneurism of the great vessels near the heart, I have given it with some advantage; but occasional bleedings and opium have been the means which have generally proved most effectual in retarding and alleviating the disease. Near the close of the disease, opium alone is to be relied upon.

Of internal remedies, then, for the alleviation of incipient aneurism, those of the antiphlogistic kind are to be preferred; for aneurism in its advanced stage, those which are called sedative, more especially digitalis and opium. All these remedies are directed chiefly to the relief of aneurism of the aorta, and of the great branches of it within the body, which are out of the reach of manual operation; the latter are useful too in diminishing those pulsations of the carotids which sometimes affect phthisical and scrophulous constitutions, even where no aneurism exists.

In aneurisms of the extremities they may be also of service; but in these diseases we have a more safe reliance, and generally may look forward to permanent cure from the helps of surgery; there the knife, the ligature, the compress, may all avail, and liberate the patient from a harassing and dangerous disease. But their application requires to be modified by particular circumstances; we will therefore take a cursory view of the different aneurisms that have been found to affect the limbs, and of the different methods which have been employed in their cure.

ANEURISMS have been found to occur in all the ramifications of the subclavian artery.

ANEURISM OF THE WRIST.—Mr. Winkleman punctured the radial artery at that point where it turns round to the thumb and fore finger. He immediately ran to a surgeon, who dressed it with lint and compresses sufficient to withdraw the bleeding. The wound did not completely heal; but in a short time a pulsating tumor was perceived, about the size of a hazel nut, which occasionally burst and bled profusely. At this time his attendant opened the tumor, and searched for the artery with a needle, but without success. Compresses and bandages were again applied, but hemorrhage frequently returned. After the patient was much weakened by the repeated loss of blood, I was called in, and having laid bare the radial artery above the tumor, secured it with a ligature. The pulsation immediately ceased; the tumor was then opened, cleared of its grumous contents, and the patient soon recovered.

IN another case, of an old woman who had been much afflicted with rheumatism, the tumor was situated exactly in the same part as in the case of Mr. Winkleman, but it had originated spontaneously, or without any assignable cause, was inflamed without pulsation, and had every appearance of an indolent abscess. Under the notion of its being such, a lancet was

plunged into it, but instead of matter, blood flowed per saltum, and was restrained only by the tourniquet, the artery was immediately taken up above the puncture, and in a short time the disease was cured. If such affections or accidents were again to fall under my care, I should endeavour to effect the cure by pressure, which may be conveniently applied by binding the artery down upon the radius. In the following case this was the practice of Tulpius.* An artery of the left hand was wounded between the thumb and fore finger: the cure was effected by means of pressure of plaster in the first instance, afterwards by a leaden plate and a tight bandage, not however, as Tulpius thinks, by the "mouth of the wound being conveniently brought together, that the internal coat of the artery might be more easily agglutinated," but by the total obstruction of the artery. This mode of cure is applicable to all the branches of the ulnar and radial arteries, which proceed to the hand and are distributed over it.

THE case of aneurism of the brachial artery, related by the celebrated Ruysch,† is remarkable on many accounts, and is, as far as my observation goes, an unparalleled instance of aneurism being produced by the application of a ligature. This was an aneurism which arose after blood-letting in the arm. An incision was made into the tumor, which had previously burst

* Obs. Med. lib. 4, cap. xvii. † Ruysch Opera, vol. 1, obs. 2.

spontaneously, and the coagula being turned out, the ends of the artery were secured by a thin thread, defended with leather, to prevent the artery from being cut through. The sac was dressed to the bottom with bovista and astringent powders. On the fourth day, the thread from the lower end of the artery was removed with the forceps, but the leather was left on till the evening. On the 5th day the ligature was removed from the upper end of the artery. On the eighth day, the dressings being taken away, the extremities of the artery formerly tied were seen, but now of a brown colour, and as though affected with gangrene. To these was applied some lint, with a leathern compress. . On the following day, says Ruysch, we used pieces of bovista four cornered, as large as the end of the thumb, on one side wet with saliva, on the other covered with astringent powders. From these remedies, the extremities of the artery appeared to be hid and covered with new flesh. But after a few days, both again appeared degenerated into two new aneurisms, there being great laxity of the flesh, fulness of the pulse, and abundant discharge of blood. One of the tumors, of the size of a pea, burst of its own accord, but did not discharge much blood, on account of pressure being quickly made on it by the patient, and in a few days, by bleeding, a slender diet, and proper compression, it was cured. But the other aneurism, though it was compressed, was not cured for some time. At length, however, it disappeared, and the patient got well.

THIS case particularly demands our attention. The dilatation at the extremity of a tied artery, I do not remember in any other instance to have seen noticed, and is contrary to the experiments of Dr. Jones upon the sound artery; but whether the mode of applying the ligature by using leather, which might prevent the internal coat of artery from being cut through, or whether the original predisposition to dilatation, or the astringent powders, were the cause of it, must remain doubtful.

Mr. MAGGILL relates, in the Edinburgh Medical Essays, a case of aneurism arising from bleeding. His plan of cure was an artful compression, by graduate compresses, wet in oxycrate, with a proper bandage, which at first had an exceeding good effect in diminishing the tumor; but it soon after began to increase, and then several machines, such as that with a screw for the fistula lacrymalis, were used without any success; on the contrary, the tumor still increased, and the skin began to inflame, and a small suppuration was brought on the most prominent part of it. By laying aside these more forcible machines, and returning again to the former compresses and bandage, after covering the small superficial ulcer with white ointment, the inflammation went off, and the ulcer healed. The tumor was now all firm and hard, scarcely yielding at all to pressure, except at the prominent part, where it was soft, and where only the pulsation could be felt when the fore arm was bended. When the limb was extend-

ed, no pulsation could be observed any where in the tumor. The patient being at this time ill, the operation proposed was delayed till his recovery, which was then performed by dissecting away the integuments, and laying the tumor bare, a strong tendinous coat was discovered, which was the aponeurosis of the biceps muscle. The membrane (which I take to be the sac, or deposition of coagulable lymph) was then opened from one end to the other, and a liquor like to coffee, with several pieces of coagulated grumous blood and polypus concretions fell on the floor, what remained was one large polypus-like substance, that weighed six ounces, which being removed, the humoral artery involved in all its coats came fully in view. About the middle of the large part of the artery a hole was seen, large enough to admit a surgeon's probe, without any retorted lips or other sign of the interior membrane being extended through the exterior, but exactly of the same appearance as if it had been made by an oval, sharp-pointed instrument. By unloosing the tourniquet, they were sure of its being the wound in the artery, and one of the assistants passing a strong probe into the orifice, raised the artery so that the aneurismal needle, with proper thread, was easily passed both above and below the artery, without engaging the nerve. During half an hour, the right hand remained cold and scarce sensible, but afterwards gradually recovered sensation and heat. Whilst the arm was proceeding towards a cure, the hand frequently became oedematous, but was completely well in three months.

Mr. FOUBERT relates (in the Memoirs of the Royal Academy of Surgery at Paris*) the case of a man, who had been let blood the preceding evening by a country surgeon. This surgeon had opened the artery in the operation, but had stopped the blood with compresses, a leaden plate, and a very tight bandage. "I did (he says) no more at that time than to loosen the bandage, as the fore arm would have been otherwise seized with a mortification. I conducted the patient to Paris, and took off the apparatus, as the arm had suffered a great deal from the first bandage. I thought it sufficient to apply another, which should make a less violent compression; seven or eight days after I examined the wound occasioned by the puncture, and perceived a small aneurism, which formed a tumor as large as a filbert. I then made a more exact compression with chewed paper, graduated compresses, a bandage, and a machine different from that called ponton, as it only presses on the tumor and the elbow, leaving at liberty the vessels through which the blood returns; no swelling followed, and the pulse was soon perceived. Eight days after I took off the apparatus, found no more tumor, and repeated the same application. At the end of forty days the patient seemed to me to be cured, and I permitted him a moderate exercise.

SOME months after he was seized with an apoplexy, and died. Being informed of it, I requested the liberty of examining the

* Tome sixieme, p. 263.

arm, which was granted me. I took out the cord of the vessels four fingers, both above and below the place where the disorder had been; this piece I carried to the Academy, in a session wherein Mr. De la Peyronie presided; he appointed Messrs. Petit, the father and son, to join with me in the examination of it, which was made as follows: The artery was disengaged from the other vessels, and we managed with caution a small hard substance which was perceived in the place of the cicatrix; it appeared to be formed by a very intimate cohesion of the aponeurosis of the biceps muscle, the capsula of the vessels, and the wound of the artery, for all these adhered together; the artery having been opened at the hinder part, we found at the place of the puncture a round hole, which answered the small hard substance, and was stopped by a solid coagulum of blood; at the outward part of this aperture it formed a small stopple, like the head of a nail, which made the union and cicatrix of the parts. It is probable, that the cure of these disorders is always made in this manner, and that compression continued for a long time may cure these wounds." See Riverius Hildanus, Tulpius, &c.

A CASE of aneurism higher on the humeral artery occurred in the Birmingham Hospital.

A. B. a girl about fifteen years of age, was admitted into the Birmingham Hospital with an aneurism of the humeral

artery, situated near the middle of the left arm. About two months before her admission, as she was carrying an earthen pot, she fell down and cut the under part of her arm with the broken pieces of the vessel. The wound was soon healed. About six weeks afterwards a small swelling was observed, but as no other inconvenience was perceived, it was neglected, until its increase and the beating of the tumor obliged her to apply for surgical assistance. When she was admitted into the Hospital, a tumor, about the size of an egg, was situated two inches above the elbow. The pulsation was violent; the limb was benumbed, and capable of little motion. I called a consultation of my colleagues, who agreed in the propriety of the operation. On the following day I made an incision two inches above the tumor, on the inner side of the arm, and dissected aside the muscles, until I came to the artery, round which I passed a probe, armed with a double ligature. I then tied the artery firmly. The pulsation ceased. The edges of the wound were brought together with adhesive plaster, and the limb firmly rolled. In the course of half an hour the fore arm and hand were very cold, without any feeling or pulse: they were wrapped in flannel, and laid between warm bricks. At eight in the evening (nine hours after the operation) they had acquired a livid or dark appearance. No sensation, no pulse at the wrist, or natural warmth in the fore arm, circumstances that alarmed me much for the safety of my patient. The warm bricks and flannels were continued, and a cordial anodyne mixture was prescribed.

On the following morning I found the limb very hot, and in much pain. The pulse was discernible at the wrist, and the patient had symptoms of fever. The artificial warmth was now omitted, and the bowels emptied by a dose of castor oil. From this time the case went on as favourably as could be expected, though not without symptoms of fever. The wound was dressed on the third day, and was in the greater part united. The ligature came away on the tenth day, and in three weeks she was discharged, cured.

IN this case ligature was preferred, as the disease had arisen from an accident, and that diseased state of the artery was not to be looked for, which so frequently prevents the healthy adhesion of the artery, and causes secondary hemorrhage.

NOTWITHSTANDING this case terminated successfully by ligature, the danger of losing my patient from want of circulation in the limb, was very great; and I should not be induced again to perform the operation upon a large artery, where we have the power of applying pressure, unless the disease had existed some time, or pressure had been previously applied sufficiently to dilate the smaller branches.

ANEURISM OF THE AXILLARY ARTERY.—Samuel Badham had an aneurism in the axilla, which terminated fatally in

February, 1805. About five months prior to his death, in consequence of lifting too great a weight, he received a strain of his shoulder, and afterwards a small swelling was observed underneath his arm; this, however, was soon dispersed, and he appeared perfectly recovered. In a month another swelling was found in the same armpit; but as he had been subject to glandular enlargements from venereal and other causes, it was neglected until it arrived at the size of a pigeon's egg. From this time the tumor increased rapidly, and in the space of two months was as large as the head of a new-born infant. It arose from the armpit and extended over the breast and shoulder. The tumor was then without any evident pulsation. The pain was intense. Sensation in the limb was defective, and it was frequently cold. The pulse at the wrist was only at intervals, and that small and fluctuating, whilst in the other arm it was in a healthy state. The tumor now opened, yet nothing but a little grumous blood oozed from the wound. In about a fortnight a large quantity of florid blood was discharged by jets from the opening. The hemorrhage was restrained by compresses and bandages. In this state of the disease I first saw the patient, and as the thinness of the integuments and former hemorrhage seemed to argue the approaching death of the patient, I recommended the operation of securing the axillary artery where it passes between the clavicle and first rib, or in case the disease should be found to extend higher up, to en-

deavour to secure the vessel above the clavicle. From the great debility it was thought he would not survive the operation, and the patient not being under my immediate care, I was unable to put it in practice. In a few days another hemorrhage took place on the opposite side of the tumor. The discharge of blood continued at different intervals for a considerable time. Pulsation was now become evident. The sides of the sac were very thin and discoloured. The patient's strength began to fail. His pulse was weak and quick, and in a few days a profuse hemorrhage destroyed him.

UPON dissection the following morning, a large cyst was found to commence at that part of the artery where it passes over the ribs, and to terminate about two or three inches above the usual place of bifurcation in the humeral artery. This sac was evidently formed by the expansion of the outer coats of the vessel, which were bulged out to such a degree, as to extend the whole skin covering the pectoral muscle up to the clavicle and shoulder. The coats of the vessel were thickened exceedingly towards the beginning of the dilatation; but in the centre of the tumor, the vessel was completely destroyed by the pressure of clots of blood, which were contained within the cyst.

CASES of axillary aneurism have hitherto been considered as dangerous as those of the aorta itself, and nothing more than

palliative remedies have been advised. But I am well satisfied, that in these cases much may be done by the art of surgery.

WHEN the aneurism is small, and situated immediately in the axilla, the subclavian artery may be compressed upon the flat surface of the first rib; and in case of necessity, I see little difficulty in cutting down to the artery in that part, where, running upon the chest, it is distinctly felt beating below the clavicle. If, however, the aneurism be large, extending towards the subclavian artery, and similar to the one now described, it would be proper to tie the artery above the clavicle. For this purpose I should recommend an horizontal incision, beginning upon the outer edge of that portion of the sterno cleido mastoideus muscle, which is inserted into the clavicle. The incision being continued close to the clavicle, through the muscular fibres, must be carried on to the origin of the deltoid muscle. Beneath this incision, the artery imbedded in cellular membrane will be distinctly felt, and should be separated from the cervical nerves by the fingers. A blunt needle, armed with a ligature, may then be easily introduced underneath, and the artery secured. This operation I have repeated upon the dead subject, and am convinced of its practicability. But the operation should be conducted with extreme delicacy and caution, and in separating the nerves from the artery, the knife should never be employed.

ANEURISMS have been found to occur in all the ramifications of the illiac artery.

ANEURISM OF THE ARTERIA TIBIALIS POSTICA.—In Mr. Warner's Cases in Surgery* will be found two instances of this aneurism; “one of a person aged 34, who was taken with the cramp a little below the ham, which was followed by an immediate swelling of the calf of the leg, attended with excessive pain. It continued in much the same state for three months, when the part began to increase both in size and pain. The whole leg was exceedingly tense, but there was not the least pulsation to be discovered, or the least visible discolouration of the integuments; however, upon presumption of its being an aneurism, from the deepness of its situation, as well as from its immediate enlargement and great degree of pain, the operation for the aneurism was attempted. Upon opening the tumor, the congealed blood appeared to have acquired a fleshy consistence, and adhered very firmly one portion of it to another. Upon removing the coagulum, the tibia and fibula were found carious, and the orifice of the ruptured artery appeared just between the heads of the tibia and fibula, so that it was impracticable to tie it, or at least judged unadvisable, considering the condition of the leg. It was amputated above the knee on the spot, and the patient did well. Upon opening the knee, the

os femoris was affected, and consequently the artery diseased above the part where it appeared to be ruptured."

HE also mentions another case of a similar nature, where the operation for aneurism was performed "in a few hours after the rupture of the vessel; the tumor increasing so fast, and the pain proving so intolerable, that it was necessary to lose no time. The tibialis postica was burst in the middle of the leg; it was taken up with some difficulty, and the patient recovered."

POPLITEAL aneurism is met with most generally among coachmen, postillions, and persons who are much in the habit of riding. The disease itself is more frequent than any other aneurism of the extremities, and is readily distinguished by the pulsation of the tumor, which may be felt in the hollow between the hamstrings, by the oedematous swelling of the leg, which generally attends this affection, and by the weakness of the pulse at the ankle. Among the various methods which have been pointed out for its cure, seldom have any been attended with success. The common method of tying the artery in the ham hath so generally failed, that to amputate the limb was considered the most safe and judicious practice. Mr. Wilmer, in his Cases and Remarks in Surgery,* when speaking of popliteal aneurism, says, "there is not, that I know, a

single case upon record, where the operation for the aneurism hath succeeded;" and till that celebrated and superior genius, Mr. Hunter, proposed the method of tying the artery above the disease, scarcely can any case be found which terminated successfully. It was Mr. Hunter's opinion, that the diseased state of an aneurismal artery frequently extended along the vessel to some distance from the sac, and that the cause of failure in the common operation arises from tying a diseased artery, which is incapable of union in the time necessary for separating the ligature. On this account he recommended tying the vessel much above the disease, and practised the operation in the following manner:—"A tourniquet was applied upon the upper part of the thigh, but not tightened, that the parts might be left as much as possible in their natural situation. An incision was made on the anterior and inner part of the thigh, rather below its middle, which incision was continued obliquely across the inner edge of the satorius muscle, and made large, to give room for the better performing of whatever might be thought necessary in the course of the operation. The fascia which covers the artery was then laid bare three inches in length, after which the artery itself was plainly felt. A slight incision, about an inch long, was then made through this fascia, along the side of the vessel and the fascia dissected off; by this means the artery was exposed. Having disengaged the artery from its lateral connexions by the knife, and from the

other adhering parts by the help of a thin spatula, a double ligature was passed behind it by means of an eyed probe. The doubling of the ligature brought through by the probe was cut so as to form two separate ligatures. The artery was now tied by both these ligatures, but so slightly as only to compress the sides together. A similar application of ligature was made a little lower. The reason for having four ligatures was, to compress such a length of artery as might make up for the want of tightness, it being wished to avoid great pressure upon the artery at any one part. The ends of the ligatures were carried directly out at the wound, the sides of which were now brought together, and supported by sticking plaster and a linen roller, that they might unite by the first intention."

THE second time Mr. Hunter performed the operation, "the artery and vein were exposed as in the former case, but not taken up with a number of ligatures, for nothing appeared to have been gained by such a practice, and the bad effects of it were obvious in the progress of the cure; they were included in one strong ligature, sufficiently tight to prevent the pulsation in the sac without injuring the coats of the vessels."*

IT may here be observed, that the application of a single ligature, and that so thin as to produce merely a simple division

* Medical and Chirurgical Transactions, vol. 1, p. 138.

in the internal coats of the artery, has been demonstrated by Dr. Jones to be the best mode to secure the healthy adhesion of the vessel. From his experiments on horses and dogs, it is evident that the ligature can scarcely be tied too firm, the desired effect being a division of the internal and middle coats of the artery, and that it should on no account be applied so loosely as merely to interrupt the circulation. For unless the internal and middle coats of the vessel are actually divided, that coagulable lymph may be thrown into its cavity, and the sides united by this interposition of coagulable lymph; the internal coat will be ulcerated before adhesion will take place, and secondary hemorrhage will ensue.

* Mr. MARSHALL, aged fifty, had a popliteal aneurism. "The tumor in the ham was about the size of a hen's egg. The operation was performed on the 22d of May. When the incision through the skin had exposed the sartorius muscle, it appeared unusually large, and the fascia covering the artery was got at with difficulty, and was indistinctly seen, the pulsation in the tumor ceased directly as the ligature was made fast, and the wound was dressed as usual. The leg continued colder than the other for two days, and then regained its natural heat. On the fourth day the dressings were removed, and the wound had a healthy appearance. Now there was a pulsation in the tumor.

* Medical and Chirurgical Transactions, vol. 2, p. 251.

On the seventh day he had his bed made, seemed to be going on very well, and drank wine, which he was very fond of, without the surgeon's knowledge. On the ninth day he had a shivering, and still drank wine. On the tenth day the wound discharged much, and the leg and thigh swelled. On the 11th day a slight bleeding from the wound, and in the evening also. The tourniquet was adjusted in readiness. On the 12th day, at four in the morning, a violent hemorrhage came on, and at nine he died.

"THE limb was examined the next day. The ligature was found to have included the artery without the vein, and when the artery was laid open, the space embraced by the ligature was quite white, and the coats at that part so thin, as to be almost transparent. There were small ulcerations through the coat by which the blood escaped; there was no union of the sides of the artery, but directly above and below the ligature the inner membrane had an unusual red appearance; it had also lost its usual polish, and had its surface covered with opaque white spots; the same also was seen in a less degree in the artery of the groin. The aneurismal tumor proved to be a diseased dilatation of the popliteal artery, of an oval form, situated between the heads of the gastrocnemius muscle."

THE three following cases of femoral aneurism are related by Mr. Warner in his Cases in Surgery; in the two first, amputation was performed, and the patients recovered; but the third is one of those in which the ligature proved unsuccessful.

" IN the month of December, 1756, J. Y. aged 35, received an hurt upon and about his knee, by falling to the ground from a man's back; the accident was immediately followed by a considerable degree of lameness and pain, which were increased by walking or standing. He continued in much the same state for about six weeks after the accident: at the end of this time, the calf of the leg was attacked with an œdematosus swelling, and in a fortnight afterwards it became so painful as to disable him from walking. The tumor continued to grow for about eight weeks, and at length extended itself so far upwards, as to affect the greatest part of the thigh; the whole of which was attended with excessive pain, but more particularly so about the knee. Thus much is related from the patient's own account.

" ON the 28th of April, 1757, he was admitted into Guy's Hospital, under my care. Upon examination, the thigh appeared enlarged to a very great size. The tumor was uniform, and extended from the inside of the knee to within a small space of

the groin; the integuments were in every part of their natural colour. Upon pressing the inside of the thigh, it appeared soft, where a fluctuation was discoverable; but there was not the least appearance of pulsation on this or any other part of the limb. The tumor on its superior, posterior, and lateral parts, was of a stony hardness.

" THE leg (which, according to the patient's account) had some time since been much swelled, did not now appear to be at all so. He was continually in great pain, and for some time past had been incapable of taking his usual rest; his appetite was bad; he was a good deal emaciated; he had a constant slow fever, which began about five weeks before his admission into the Hospital; and he appeared pale and sallow in his complexion. From the time of his being placed under my care to the end of ten days, there was no apparent alteration in the swelling, nor in the symptoms attending it. In expectation, therefore, of affording him that relief which I thought could by no other means be given, I judged it adviseable to open the tumor, which I did by making an incision into its most prominent part, upon which there immediately gushed out a large stream of thin florid blood, and at this instant discovered to me the true state of that disease, which till now could not be ascertained by any peculiar symptom, distinguishable by the touch or perceptible to the eye. Seeing this, I immediately

filled up the wound with lint and tow, and proceeded in as expeditious a manner as possible to apply a tight bandage upon the thigh, near to the groin; and lest this might accidentally break, I applied a second ligature a little below the first, and proceeded to amputate the limb upon the spot. During the operation the patient fainted; but he soon came to himself again, and without any bad symptom, gradually recovered his health, strength, appetite, and rest, and is now in good health.

" UPON a dissection of the thigh and leg, I discovered the following appearances:—A considerable part of the fleshy portions of two of the extensor muscles of the leg (to wit) the vastus internus and crureus, with the subjacent periosteum, were destroyed. Four of these muscles, whose uses are to bend the leg, and which compose the internal and external hamstrings (to wit) the gracilis, semitendinosus, semimembranosus, and biceps tibiæ, together with that adductor and flexor muscle of the leg, called sartorius, were removed at a considerable distance from the inferior part of the thigh-bone, and from the upper parts of the tibia and fibula; by which means a large bed was formed for containing the extravasation, which consisted in part of a fluid, and in part of a coagulated blood; by much the greatest portion of the coagulated blood was firm, and had acquired the texture and appearance of brown macerated leather. The several muscles I have mentioned had a livid and putrid appearance.

The os femoris was carious on its anterior and posterior parts, and for the space of several inches above the condyles of that bone, with the course of the linea aspera, as well as on the convex or anterior part of it, there were many exostoses.

" THE capsular ligament of the knee-joint was much thickened, and contained about two ounces of a yellow and viscid synovia.

" THE femoral artery, on its inferior part, some distance above its division into the tibialis antica and postica, was diseased; which disease extended four inches upwards. The coats of the artery were considerably thickened, and lacerated longitudinally. The smallest diameter of its cavity, in the diseased part, was two inches and one quarter; the largest diameter was two inches and one half. That part of the artery below the disease was somewhat smaller than the vessel naturally is.

" SINCE the above-related case of the aneurism of the femoral artery, I have met with a second instance of the like disease, where the circumstances that attended the tumor differed so little from those of J. Y. that I think it needless to say any more upon the subject, than that, upon inspecting the thigh after the amputation of the limb, the bone was found more diseased, and the artery more torn,

"IN November, 1775, a third case, similar to the preceding, I had an opportunity of seeing, where the operation for the aneurism was performed by tying the artery above the diseased part only. In about five days after the operation an hemorrhage ensued, and on the seventh day the patient died. From the second day after the operation the leg began to mortify, and continued so to do till his death. Upon opening the thigh, and inspecting the parts, the lower part of the os femoris was found to be carious, and the tendinous parts much diseased."

FROM the case of J. Y. as well as from others related by Mr. Warner, it will appear that pulsation is not an universal attendant on the disease; but I must acknowledge, that in my practice, no case has occurred in which I have not been able, by a steady and accurate attention, to discover a pulsation, although, in some cases, it will require minute observation; and where rupture has succeeded dilatation, or has been the original cause of deep-seated aneurism, I have generally observed that jerking, thrilling, tremulous sensation described in the varicous aneurism, even where the pulsation itself could not be so plainly perceived.

IN the Edinburgh Medical Commentaries* is related the history of an aneurism of the crural artery.

* Decade 2, vol. 3, page 326.

"PATRICK DONALD, about forty-eight years of age, a hardy, active man, had been long in the West Indies, but enjoyed good health, and had still a good constitution, complained of a tumor in his left groin, about the size of a large turkey's egg, which was found to be an aneurism of the crural artery. A truss was ordered to be prepared in a particular manner, so as to keep a constant and gentle compressure upon the tumor. He was directed to live upon milk, vegetables, and fruits, and to avoid spirituous liquors and animal food. He recollects about a month or six weeks previous to this time striking his groin with some violence against the corner of a table, which gave him excruciating pain for a moment. Ten days afterwards he perceived a swelling in the place he had struck, about the size of a pigeon's egg, which gave him some pain. In three months it increased to the size of a common melon, and the throbbing pulsation so strong, that it could be observed at a distance, even when covered with the bedclothes. The truss had been laid aside for some weeks, on account of the excessive pain he felt from the least compressure of the tumor. The pain was become so violent, that he could not rest at night, and he had very little ease in the day. His leg and thigh of the same side were much wasted; he had pain and stiffness in the knee, and the tendons were so contracted, he could scarcely walk. His bowels were kept open, and the pain was somewhat relieved by a liniment of sweet oil and opium. Laudanum was given him every night

till he took two hundred drops, without obtaining the smallest ease. The laudanum was omitted, and twenty grains of cicuta was given instead, which threw him into a delirium that continued forty-eight hours, during which time he felt no pain, but seemed to enjoy a sort of happiness. From this time he was perfectly free from pain, and there was no further occasion to repeat the cicuta; but on examining the tumor, we observed some black spots on the surface and round the edges of it. The tumor continued to mortify, and at length the whole became loose round the edges, and in a few days dropped out. A large sac was left, covered with coagulated blood. When the greater part of the coagula had come out, a small piece was observed to plug up that part which was supposed to be the opening of the artery. There was, however, no pulsation to be felt near it. During this time he was supported with bark and a nutritious diet. The sloughs came away, and the wound began to granulate. He was now seized with symptoms of fever, in consequence of imprudently exposing himself. The limb became painful and rigid. He obtained but little relief from a purging emulsion and the use of fomentations. His lungs became affected: he expectorated much: the ulcerated part put on a bad appearance, and in a few days he died.

" UPON dissection, a probe was introduced into the upper end of the artery, which passed into the opening where the aneu-

rismal sac had been. But when introducing it into the lower end, we could not get it to pass, which obliged us to lay that part of the artery open, on which we discovered a hard horny substance, about an inch and a half long, plugging up the artery, and adhering closely to the sides of it. A substance of the same nature was also found, plugging up an external branch of the crural artery, which opened into the sac. After dividing the iliac artery a little below the bifurcation, and removing it, about two inches up from the abdominal ring was found a red horny substance, an inch long, resembling that in the crural artery. It had a small opening in the middle, which would only admit of a very small wire to pass; it adhered closely to the inner side of the vessel, and plugged it up. From the bifurcation to the substance, the coats of the artery were in a sound state; but between that and the ring they were somewhat corroded, and contained a quantity of pus. The muscular and tendinous parts about the articulation of the os femoris being removed, the capsular ligaments were found to be almost destroyed, and the head of the bone, the acetabulum, part of the ilium, and pubes, were so much corroded and so spongy, that they were easily penetrated by the probe; the lungs were in a purulent state; the heart and stomach were a little eroded in several places, and something like pus appeared between the heart and the pericardium."

THE following case of aneurism of the posterior iliac artery, passing from the sciatic notch, was cured by Mr. John Bell.*

"A POOR man, who was by trade a leech-catcher, fell as he was stepping out of a boat, and the long and pointed scissors which are used in his business being in his pocket, pierced his hip exactly over the place of the sciatic notch, where the great iliac artery comes out of the pelvis. The artery was struck with the point of the scissors; it bled furiously; the patient fainted; and in so narrow and deep a wound, the surgeon, when he came, found little difficulty in stopping it up, and less difficulty still in making it heal. The outward wound was cured; the great tumor soon formed; and the man travelled up from the north country, where the accident had befallen him, and in six weeks after arrived in our hospital here, with a prodigious tumor of the hip, his thigh rigidly contracted, the ham bended, the whole leg shrunk, cold and useless, as if it had been an aneurism rather of the artery on the fore part of the thigh.

"THE tumor was of a prodigious size, and by that very circumstance of its being one of the greatest aneurisms, it had lost all the characteristics of aneurism. There was no pulsation, no retrocession of the blood when the tumor was pressed upon. There was nothing else peculiar in the tumor except this, that the great and sudden distension occasioned great pain; and from

* Bell's Principles of Surgery, page 421.

the continual pain and lameness, and from having some hopes of a cure, he was ready to submit to any thing, beseeching us to operate.

" THERE was little doubt of this being a great aneurism, but there was a possibility of its being a vast abscess; and it was resolved in consultation, that the patient should be carried into the operation-room; that a small incision should be made; that the skin being cut, the bag itself should be just touched with the point of a lancet, and if found to contain matter, it should be fully opened; but if blood, then it was to be considered as an aneurism of so particular a kind, as to entitle us to call for a full consultation.

" I MADE an incision two inches and a half in length: the great fascia of the hip appeared blue, and very strong, forming the coat of the tumor, and there were seen the big fibres of the great glutæus muscle. The knife was struck into it, and large clots of very firm black blood rolled out; for such was the tenseness of the tumor, that it began to emit the clots in this way the moment it was punctured. There was one thing further desirable, that before we put the patient to bed, we should understand the case so far as to be able to report to the consultation, whether the artery was absolutely open, and whether it was the great artery of the hip. I continued therefore (knowing that the opening I had made could be covered with the point

of the thumb) to pull out a few more clots, till the warm and florid blood began to flow; I then pushed a tent-like compress into the small wound of the tumor (viz. of the fascia) laid a broad compress upon the outward wound, and put the patient to bed, with one of the pupils holding the hand upon his hip.

" THIS was done at one 'clock, and at four the consultation met, and the operation was performed. And in my notes I find two steps of the operation chiefly marked:—First, that upon our opening the tumor fully with an incision of eight inches long, and turning out the great clots, the blood was thrown out with a whizzing noise, and with such impetus, that the assistants were covered with it, and in a moment twenty hands were about the tumor, and the bag was filled with sponges and cloths of all kinds, which had no better effect than the cloths which, in any accident, the friends in great confusion wrap round a wounded arm; for though the blood was no longer thrown in a full stream, nor in jets, it was seen rising through the edges of the incision; it floated by the sides of the cloths, which were pressed down by the hands of the assistants. But we knew also, by a more alarming sign, that the blood continued to flow; for the man, who was at first lying not flat, but supporting himself on his elbows, fell down, his arms fell lifeless and without pulse over the side of the table, his head hung down, his face was livid, he uttered two or three heavy groans, and we believed him dead.

" **SECONDLY**, seeing in this critical moment, that if he was to be saved, it was to be only by a sudden stroke, I ran the bistort upwards and downwards, and at once made my incision two feet in length: I thrust my hand down to the bottom of the tumor, turned off the great sponge that was over the artery, felt the warm jet of blood, put the point of my finger to the mouth of the artery; then I felt distinctly its pulse, and then only was I assured that the man was alive. The assistants laid aside the edges of this prodigious sac, and sought out the several smaller sponges which had been thrust in, and the sac being deliberately cleaned, and its edges held aside, I kept the fore finger of my left hand upon the artery, passed one of the largest needles round under my fore finger, so as to surround the artery, one of my friends tied the ligature, and then, upon lifting the point of my finger, it was distinctly seen that it was the posterior iliac artery; that the artery had been cut fairly across, and had bled with open mouth; that it was cut and tied exactly where it turns over the bone: and although the extremities were cold, the face of a leaden colour, and the man had ceased to groan, and lay as dead; though the faint pulsation could not be felt through the skin, in any part of the body, we saw the artery beating so strongly under my finger, that we were assured of our patient's safety. However, he was so low, that after laying down the sides of the sac, and putting bandages round his body to keep all firm, we were obliged to have a bed brought in, and

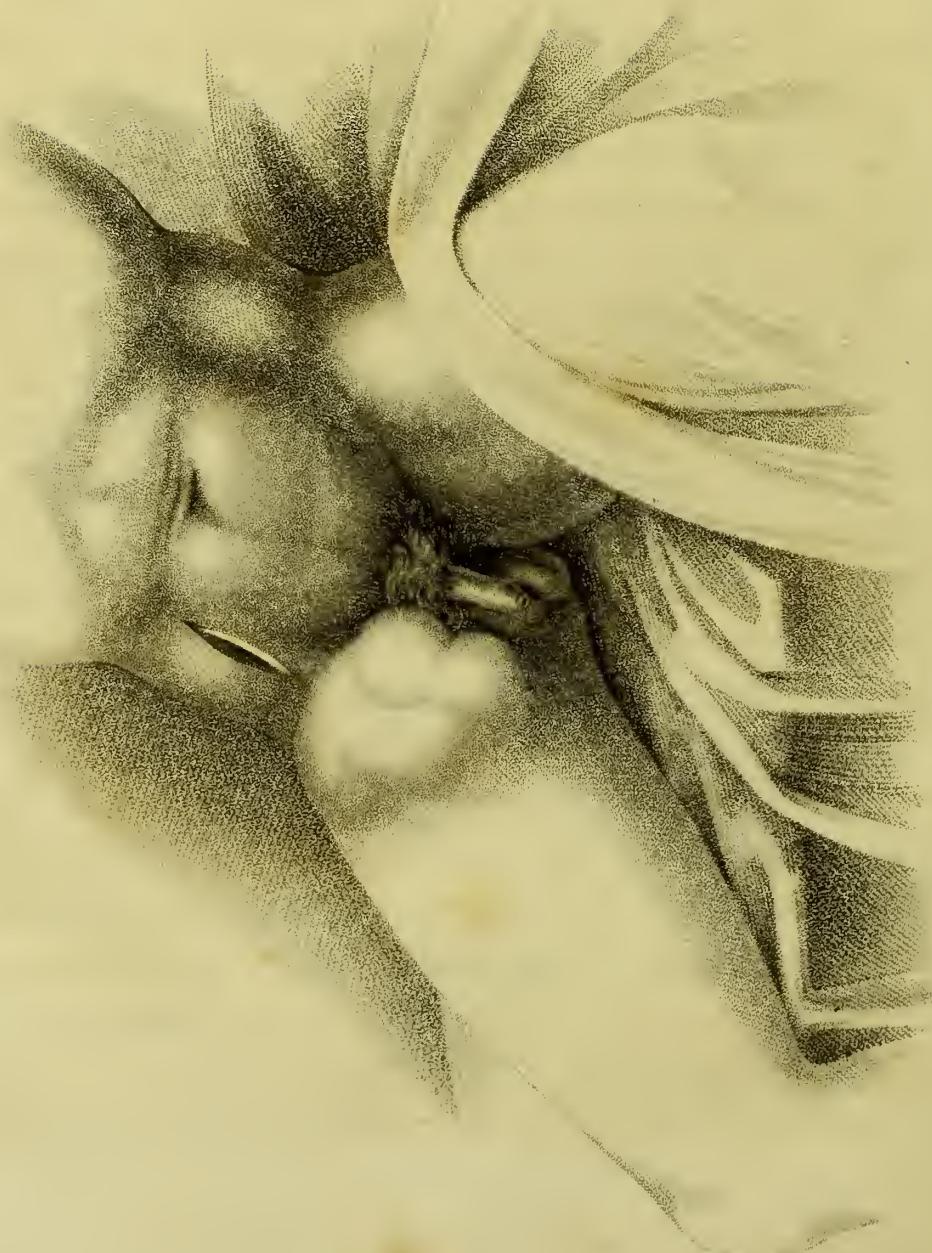
having given him some cordials, we left him to sleep in the great operation-room, attended by the pupils and by nurses. He passed his urine and faeces involuntarily for some days, and was long in recovering his voice.

“ HE was cured of this great wound in less than seven months, although his cure was protracted by the foul suppuration of such a sac, and by the exfoliation of the ilium and sacrum, which spoiled not so much from their having been laid bare by the last sudden stroke of the knife, as by the aneurismal blood having pressed upon them; the exfoliations were very large, and the sacrum especially continued exfoliating to the very day on which the wound closed.

“ I DO NOT know whether this man has recovered entirely, for he left the house lame, from the contractions of the hip and ham, and walking by the help of a stick; but, however, he thought himself fit to undertake his profession, and went to England with that design.

“ Dr. FARQUHARSON, who succeeded me in the charge of the Hospital, has since informed me of this man having called upon him, after his return from England, walking stoutly, and in good health.”

17^t D.O.V.Y.A.I.D.S. A.N.E.I.R.T.S.M.



*FEMORAL ANEURISM CURED BY TYING THE
EXTERNAL ILIAC ARTERY.*

I HAVE now to present to the public the case of James M'Donald, on whom I performed the operation of tying the external iliac artery, after the method recommended by Mr. Abernethy. As this is the first case on record, wherein this operation completely succeeded, I shall detail every circumstance minutely; expressing at the same time my acknowledgments to that able and intelligent surgeon, for the instruction I received from his sagacious practical remarks, as they are delivered in the case of James Lindsey,* and more at large in the case of Wrungel.†

"THE operation of tying the external iliac artery must," says Mr. Abernethy, "in the present state of our knowledge, be considered as very serious in its nature, and uncertain in its event. I once tied this vessel when a man would otherwise have bled to death from the femoral artery; and though the limb was nourished, the artery ulcerated. The operation was done a second time in London, and the limb mortified; but no fair practical inference can, I am told, be drawn from the latter case, as the operation was postponed till mortification was, as it were, impending."‡

* Surgical and Physiological Essays, part 3, p. 154.

† Surgical Observations, p. 210.—‡ Ibid. p. 211.

I AM truly thankful that the case I have now to relate terminated more fortunately; not merely because it gratified my own personal feelings, though I must confess, that the successful termination of it was indeed grateful to my soul—but as a proof that the chirurgical art does not stand still, and that some diseases formerly esteemed hopeless, are now submitted to our controul.

JAMES M'DONALD, aged twenty-seven years, a Scotchman, of large robust stature, and strong muscular fibre, was admitted into the Birmingham Hospital on the 19th of September, 1806, with a large aneurism of the femoral artery, situated immediately below Poupart's ligament, and extending downwards about five inches. From his trade (that of a smith) he was exposed to violent bodily exercise and frequent transitions from heat to cold; he was a hard drinker, and had had the venereal disease; but except from the latter cause, and some slight accidents, he never suffered a day's illness in the whole course of his life. He recollects no particular incident from which he can date the origin of his disease, unless it arose from some violent exertions by raising a large sledge-hammer in the beginning of June preceding, immediately after which he perceived a small swelling at the upper part of the thigh. The tumor, at the time of his admission, was equal in size to a large lemon, commenced immediately below Poupart's ligament, and extended five inches down the inner part of the thigh. The elevation

of the integuments was uniform, except in the centre, where there was a small eminence. The skin was not discoloured, but a strong pulsation was both seen and felt, which at once decided the nature of the disease. The limb was somewhat swollen; but although the pain was considerable, he could walk and place his heel on the ground. His pulse was full and quick. Twelve ounces of blood were immediately taken from the arm, and ten drops of the tincture of digitalis were given three times a day. The aneurism daily increased, and the limb became more swollen and oedematous. On the fourth night after his admission into the Hospital, he had most excruciating pains of his knee, which extended upwards to the disease. The following morning the tumor was enlarged considerably, and the elevation of the integuments extended an inch further towards the hip. The skin now looked shining, tense, and red; his countenance ghastly; his pulse full, hard, and quick; his bowels costive, and his tongue covered with a brown fur. He was again bled, took repeated doses of laudanum with digitalis, castor oil was given occasionally, and cold water was applied to the tumor, which gave him some relief; the inflammation was a little suspended, and the tone of the vessels of the skin was somewhat restored by the cold applications. Under this treatment he continued for a week, with very little pain, except at night, at which time the pain generally came on, the unfavourable symptoms returned, with violent and lancinating

pains down the thigh, particularly at the knee, and the whole limb was benumbed. The tumor enlarged towards the hip, and this elevation formed another apex, to which the inflammation had extended. By the first of October the tumor was astonishingly increased, raising the bed-clothes with its frequent and strong pulsation. The œdema had swollen the thigh to twice its natural diameter, and above this general enlargement the tumor appeared equal in size to a large melon. The man's countenance was haggard, pale, and deathly, his strength was exhausted by the continual pain and sleepless nights, and he lay imploring an alteration in his present condition, and intreating for his dose of laudanum, which was administered to him in the quantity of fifty drops repeatedly. In this state, death seemed rapidly approaching, and the only resource remaining was to secure the iliac artery by ligature, a doubtful, dangerous, and at this time, no previous case having succeeded, almost a hopeless experiment, yet sanctioned by the deplorable condition of the patient, and by the well meant attempts of Mr. Abernethy.

ACCORDINGLY, on the 4th of October, the patient was carried upon a bed into the operation-room, and in that condition placed upon the table. In the presence of my friends and colleagues, Mr. Kennedy, Mr. Vaux, and Mr. Tomlinson, as well as many other gentlemen of the profession, whom I had invited

upon this interesting occasion, I began the operation by making an incision about one inch and a half from the spine of the ilium, beginning about an inch above the spine of the ilium, and extending it downwards about three inches and a half below, forming in the whole an incision four inches and a half in length, and extending to the base of the tumor. By this incision the skin and cellular membrane were divided, and the tendon of the external oblique muscle was exposed. Through it an opening was made the length of the external wound ; the incision was then carefully and gradually continued through the internal oblique muscle. Between the peritoneum and transversalis muscle the finger was then introduced, which served as a director to the crooked bistort with which the muscle was slit up. This part of the operation being done, carefully avoiding any unnecessary disturbance, I separated the peritoneum with my finger, till I could feel the artery beating ; but in this patient the artery was so firmly bound down by its fascia, that I could not get my finger under it without using the knife to divide the fascia. I must acknowledge, this was the most difficult and dangerous part which I had to perform. But a form so athletic as that of my patient, with a fibre so hard, will not be often met with, although whenever it is, care and attention will surmount the inconvenience. Having separated the artery on each side from its surrounding parts, I passed a curved blunt needle, armed with a strong ligature, which I tied very tight, with the

intention of dividing the internal coats of the artery (according to the experiments of Dr. Jones).

WITH one ligature and a common double knot, I secured the external iliac artery. The pulsation in the tumor immediately ceased. The ends of the ligature were left out of the wound, which was closed by three stitches and some straps of adhesive plaster. The whole was retained by compresses of lint and a roller passed round the body. A branch of the circumflex iliac artery was divided in the beginning of the operation; but after this was secured with a ligature, scarcely a drop of blood was lost.

SATURDAY, Oct. 4. Before the operation, pulse 82. not very full, had four or five stools from a clyster.—*One o'clock*, immediately after the operation, pulse 94. full, no sensible diminution of heat in the limb, which was placed in an elevated position, with pillows, and wrapped in warm flannel.—*Five o'clock*, pulse 96. fuller and rather hard, heat of the limb 85. sound limb the same, pains in the knee, says the wound feels *stunned*, tongue a little furred and brown, no stools nor urine, bloody discharge through the bandage, took nothing but milk and water.—*Nine o'clock*, pulse full, hard, and quick, 103. Face flushed, tongue red, gentle perspiration, heat of the limb 85. of the neck 85. much pain at the wound, can feel his toes better

than before the operation, limb benumbed, bled to ten ounces, took a little tea.

SUNDAY, Oct. 5, *eight o'clock* in the morning, pulse 102. not very hard but full, tongue white, in a fine perspiration, has a difficulty in making water, made but once since the operation, sensation in the limb, heat 90. sound limb 90. no pain in the wound, which only feels sore when he moves, very thirsty, no stool, has taken milk and water, with tea, no sleep, but on the whole comfortable; blood buffy and much serum.—*Twelve o'clock*, much the same, pulse fuller, has made no water, very thirsty, bled to fourteen ounces, urine removed by catheter.—*Five o'clock*, very low and faint, pulse 120. limb hot, the whole body in a perspiration, made about an ounce of water, frequent pain at the wound. Milk and water has been his common beverage since the operation. Mutton broth was now ordered, and five grains of nitre were given.—*Nine o'clock*, much recovered from the lowness, had taken a pint of warm mutton broth, and felt himself better; pulse 106. no stool or urine, had repeated the nitre, with a sweetened solution of cream of tartar; skin moist, not in pain; twenty drops of laudanum were given in an ounce and a half of decoction of nitre and camphor julep, which was ordered to be repeated every four hours, with or without the laudanum, as necessity required, and to drink half a pint of weak wine-whey in the night. Limb as hot as the sound one.

MONDAY, *eight in the morning.* Had refreshing sleep of four hours from one dose of the laudanum, made two pints of water, pulse 108. full but not hard, no stool, no pain, free perspiration, tongue white.—*Twelve o'clock,* an ounce of castor oil was given, and he drank a basin of mutton broth. The tumor felt softer.—*Nine in the evening.* Had had three stools from the castor oil, which had been repeated; felt rather weak from the evacuation, tongue white, pulse 112. perspiration free; repeated the broth and the draught with laudanum at bedtime.

TUESDAY, Oct. 7. Had taken a pint of broth in the night, and had four or five hours of refreshing sleep; in a profuse perspiration, no urine or stool, pulse 100. tongue white, limb of its natural warmth.—*Twelve o'clock.* Took four ounces of milk at breakfast, and at eleven some broth; still perspired; continued the mixture with nitre and camphor, passed his urine freely, wound dressed, the roller not altogether removed, but cut off at the sides, a good discharge of pus, wound but a line entirely united, stitches still remained, dressed with a simple cerate and compresses, retained by sticking plaster and a napkin after dressing, pulse 106. not hard or full, tumor feels softer, and the limb appears less in circumference.—*Five o'clock,* in a perspiration, has taken a pint of broth, and his medicine regularly. In the evening he was very comfortable, and passed his urine freely, and the limb was warm.

WEDNESDAY, Oct. 8. He had slept well for four or five hours, had taken a sufficient quantity of liquids, continued his usual diet, with the addition of rice-pudding, passed his urine freely, had no stool, pulse 92. the heat of the limb natural, and in a gentle perspiration. The wound dressed, a free discharge of good laudable pus, parts around not hard or swollen, tumor evidently less and softer, inflammation diminished, and limb smaller, but complained of a pain in the knee, continued his mixture, and the draught repeated at bedtime.

THURSDAY, *eight o'clock*, in a perspiration; had no stool nor passed urine since two o'clock, but slept four or five hours; wound looks well, good purulent discharge, the dressing having slipped a little, was dressed again with adhesive plaster and compresses; the limb and tumor gradually lessening, ordered an ounce of castor oil, which operated before bedtime, when the anodyne draught was repeated.

FRIDAY, Oct. 10. Had slept but little; complained of restlessness from the hardness of the bed, not having moved since the operation; ate his food well, and took his medicine regularly. The bed and his shirt were changed, and he did not appear affected by the exertion. The wound looked well, and much the same as on Thursday; dressed as before; tumor less, soft and shining, and seemed inclined to suppurate. Limb much less. Took

rice-pudding at dinner, and broth in the afternoon; had a stool; the anodyne draught repeated.

SATURDAY. He had not slept well during the night, supposed to be from the exertion of changing the bed and linen the preceding day; his tongue a little white; wound dressed as usual, looked well, and discharged but little; pulse 86. had taken broth and tea frequently, continued in a perspiration, and the draught was repeated at bedtime.

SUNDAY, Oct. 12. Had slept six hours, his pulse strong and good, and appeared to go on well in every respect.

MONDAY. The same. An ounce of castor oil given.

TUESDAY. Had a good night, but no effect from the castor oil. The wound more united. The ligature from the circumflex artery which was divided and taken up in the operation, came away, and was followed by a little pus. The anodyne draught repeated.

WEDNESDAY. So well, that I thought it unnecessary to see him oftener than once a day. His perspirations, which had hitherto been great, were now diminished; his appetite good, his pulse 80. and strong, in no pain, the limb and tumor smaller,

and but little discharge from the wound, which had a healthy appearance.

THURSDAY, Oct. 16. Had not slept well, but his appetite good and no fever. Wound looked healthy. Stitches cut away. The ligature seemed to have come a little out of the wound, and appeared longer. The anodyne draught repeated.

FRIDAY. Slept better. The Ligature was evidently advancing.

SATURDAY. The wound appeared quite united. His health improved. Allowed meat at dinner. The ligature had protruded an inch farther. The opiate omitted.

SUNDAY, Oct. 19. This was a joyful day to the poor fellow, who had apprehended much from the coming away of the ligature. The ligature came away without any force, or the least hemorrhage. From this time I considered my patient safe, and the operation to have completely succeeded.

THE tumor, during the progress of his recovery, put on a variety of appearances. The first week after the ligature came away, I perceived no sensible diminution. It was soft and

fluctuating in the centre, and the walls of the sac were distinctly to be felt. In two or three days afterwards it looked bruised, and discoloured on one side. This appearance increased, and he complained of pain in his heel, and said his knee felt benumbed. The tumor was thought enlarged, and I had doubts whether it would suppurate, gangrene, or be absorbed. He was ordered the decoction and powder of bark, with more generous diet, and to bathe the tumor frequently with cold water. In a few days we had the satisfaction to see the tumor become considerably less, the former fluctuation was not perceptible, the whole was firmer, and the surrounding parts had a more healthy appearance; the discolouration gradually went off, and in the course of a fortnight, the tumor was so far diminished as to be nearly level with his thigh, without any apex or prominent point.

HE now daily walked two or three miles in the town, and was considered well, with the exception of occasional pains in the knee and numbness of the limb, which diminished upon moderate exercise. The rarity of this case induced the Governors to allow the man to stay in the Hospital, where he was employed as a messenger for some time after his cure, that his health might be established before he went to his father's house, in Scotland, from whence he has since written to me, and says he continues perfectly well.

TWELVE months had not elapsed after the perfect cure of my patient, ere I had an opportunity of witnessing this operation skilfully performed by Mr. Tomlinson. The patient was a spare but healthy man previous to this disorder; and with respect to the operation itself, nothing material occurred which I have not already noticed in relating the case of M'Donald. Of its successful termination, Mr. Tomlinson has favoured me with an account in the following letter:—

" MY DEAR SIR,

" I SEND you the case of Mr. Archer, on whom I performed the operation for the cure of femoral aneurism in your presence. This instance of successful practice, added to that which had previously fallen under your immediate observation, I hope will be of sufficient weight to recommend to other surgeons this mode of cure, which was first pointed out by that able and sagacious surgeon, Mr. Abernethy, and afford a proof, that one of the most deplorable maladies of the human constitution, and one of those which formerly admitted of no relief, has submitted to the control of our art, and in this instance has snatched an individual from inevitable destruction, restored a loving and affectionate father to his family, and a worthy member to society.

" IT is no small satisfaction to me to send you this instance of success in a disease of such importance, from its having occurred twice so recently in the town of Birmingham.

" I DO not mean to arrogate any undue praise to myself, or heap it upon you; but to convince the world that our profession is advancing very rapidly, and that the capability of performing the most complex and difficult operations is not confined to the metropolis, or other great schools of medicine.

" Mr. ARCHER is about forty years of age, and hitherto of good constitution; his employment formerly, turning and making bridle-bits in a lathe. It was four months after he first began to complain of indisposition that I was consulted, and I have to observe, that prior to my visiting him, he had been using a very heavy plate of lead over the tumor, and thought at one time the swelling diminished; but the hope of obtaining any permanent relief from this treatment soon vanished, and he applied to me.

" THE tumor was nearly the size of a large full-grown apple, and the pulsation very considerable. As the skin was thin, and the health of the patient declining, I recommended the immediate operation, which he submitted to on the 29th of August, 1807.

"IT is unnecessary to mention to you, that only one ligature on the iliac was made use of, and the artery of course not divided; and I have the most sincere pleasure of informing you, that the operation has been completely successful, without one unfavourable symptom having attended the cure. There has not been any inflammation, no pain, no larger secretion of pus than was necessary in the places of the external ligatures, whilst the remainder of the incision healed by the first intention, the large ligature came away on the 23d of September, and my patient declared cured on the 28th.

"THE tumor is very considerably diminished. From the first moment after the operation, the circulation of the blood was completely adequate to the purposes of the limb, which continued its natural warmth and sensation.

"T. TOMLINSON.

"*Birmingham, 20th Oct. 1807.*"

SUCH sometimes is the result of the operation for aneurism when situated upon the extremities, and the benefit of tying a ligature upon the artery above the tumor. But it is a well known fact, that this plan frequently fails, and when we examine the state of the arteries where aneurism has existed, it is often evident, that the injury done to the

part, by the operation on an aneurismal artery, is very liable to produce that degree of inflammation denominated ulcerative, in which case the operation will not succeed, and the patient will be probably destroyed by the bleeding of the vessel. Pressure is another mode of cure, which has frequently been tried, but in general the pressure has been made upon the tumor itself, thereby producing much pain, and occasionally mortification of the part.

THE failure of those cases mentioned in the Medical and Chirurgical Transactions, seems to have arisen from the previous state of the artery, and I am well convinced, that in most spontaneous aneurisms, the arteries in general will be found inflamed. Ligatures applied under these circumstances, instead of producing an adhesion of the vessel, which alone can save the patient, frequently produce ulcerative inflammation, hemorrhage, and death, without giving that chance of a cure, which Nature alone sometimes effects; for I am induced to believe, that as many successful cases will be found upon record, where pressure, either by the assistance of art, or by the spontaneous swelling of the part, has produced a cure, as are related of the operation.

DEPOSITION of earthy or ossific matter in the coats of arteries is likewise another attendant upon aneurism, which very much increases the danger of the operation. In subjects ad-

vanced in life, ossification of the arteries is not uncommon; and when a ligature is drawn upon a vessel so diseased, it either snaps at the moment, or cannot be drawn sufficiently tight to intercept the stream of blood; or some small spicula of bony matter are pressed against the opposite side of the vessel, to which it will not adhere; the part ulcerates, and a secondary hemorrhage ensues.

Mr. MARSHALL's case, selected from a large number,* and mentioned in the foregoing pages, will more particularly illustrate the above conclusions, and which, from the length of time the patient existed after the operation, and the appearance of the arteries upon dissection, leave us no reason to doubt but that the vessels were previously in a state of disease. If this can be ascertained as a general fact, and some other less dangerous mode of cure can be adopted, it certainly is not warrantable to trust the life of our patient to the risk of an immediate adhesion, which, under the most favourable circumstances, must always be considered doubtful.

THE operation, therefore, for aneurism by ligature, is not always a certain experiment. This danger does not arise

* Ruysch, vol. 1, obs. 2. Guattani de Aneurismatibus. Medical and Chirurgical Transactions, vol. 1, p. 158 and 166. Wilmer's Observations. Abernethy's Surgical Observations. Medical Journal, vol. 3.

from the uncertainty of the anastomosing vessels carrying on the circulation, for where the disease has existed some time, no apprehension on that ground should intimidate us; but the probability of the ligature ulcerating the artery, and thereby producing a fatal hemorrhage, is a circumstance too frequent not to be dreaded.

FROM these considerations I have been induced to examine a variety of authors, who have written upon aneurism, and to enquire into the causes that produced a favourable termination in many, when the operation was avoided. In all these cases the artery was doubtless obstructed, and in those in which the opportunity offered of examining the tumor, that obstruction was always produced by coagulable lymph filling up the cavity of the artery, uniting its sides, and interrupting the passage of blood.

Mr. FORD, in the ninth volume of the Medical Journal, has called the attention of surgeons to the spontaneous cure of aneurism, and notwithstanding the successful cases related by him, it does not appear that any general practical inference has been drawn from those observations. Indeed the frequency with which the operation of tying the artery above the tumor has of late been performed, gives reason to believe that this practice has rather gained ground among practitioners of the

present day. But for the reasons stated above, surely it behoves us to attempt a mode of cure which incurs no considerable risque, and at least not to perform a dangerous operation till we have tried compression, and all the other more safe means in our power.

OF these means, compression is the chief that can be tried for the cure of aneurism, without incision. As a curative instrument or agent, it has been employed probably from the first practice of surgery; for when a wound was inflicted and blood discharged, what could be more natural than to bind up the wound? But as a *principle* of practice, its use is of later date. That it has been casually and successfully used in every æra of surgical history, I do not deny. Bandages or ligatures form a part of the instruments in every surgical work extant; but we shall look in vain for any precise rules, depending upon principles for their application, till the art had advanced beyond the middle of the last century. Guattani, surgeon to Pope Clement XII. first employed compression systematically for the cure of aneurism, and as a substitute for the very dangerous operation which was usually recommended for its cure. Guattani dates his second case 1756; his book was not published at Rome till 1772. The intermediate time was probably occupied in reducing his principle to practice, and in ascertaining by experiment, the general usefulness of a system,

which, next to the union by the first intention, is the most important modern chirurgical improvement.

MANY untoward accidents and sudden deaths from the hemorrhages of wounds apparently insignificant, first put Guatani upon the watch, and induced him to adopt this practice. Its success he has evinced beyond all doubt, and in adducing some of his cases, I shall not leave it in the power even of scepticism to cavil.

IT is one of the most common experiences of mechanics, that an elastic body may be squeezed into a narrower compass by compression, and that so long as the compression is sufficiently great to counteract the resistance of the body compressed, it will continue to occupy less space. All the component parts of the human body, and the bodies of animals, are more or less elastic, and the great variety of motion required in the actions of all animals, render such a state of composition necessary; for every motion either extends or contracts certain fibres of the organ moved. All the parts of the body, therefore, admit of compression, more especially the soft parts; on them, therefore, is the act of compression most useful and practicable. But in living bodies, compression not only acts by putting parts closer together: when they are in this state, they have a tendency to unite and to remain united, and also to occupy smaller space.

Even without uniting, they are squeezed closer together, and then in many instances perform functions in a more healthy manner. Thus, in a wounded canal of any kind, when the lips of the wound are placed together, they unite, and the matter that naturally passed, is suffered again to pass, without being effused. Such was the case of wounded intestine under the management of Mons. Dessault. In haemorrhoids, the painful operation of Mr. Pott is avoided; the parts being compressed by a bougie, the bunches of tumid veins are squeezed into narrower compass, muscular power and tone are restored, absorption goes on, and at last the disease vanishes.

THE cellular texture, the bed upon which all nerves, absorbents, and blood-vessels are deposited, and through which they run, which is the medium of communication between all parts, and of course most affected of them all in the diseases of the several organs, is universally affected by compression, and from its contractility, we may probably account for the great benefit which it is capable of producing. Of the parts capable of being contracted, it is almost unnecessary to observe, that muscular fibres are the most contractile, and next the cellular membrane. The universality of cellular membrane in the construction of parts, makes the application of compression in case of disease co-relative; for it is only when the cellular membrane loses its contractile power, which it does in some

cancerous cases, or when parts are mortified, have lost their action, and are become nearly putrid, that its compression cannot take effect.

COMPRESSION is of two kinds in its application: The first species includes the apposition or collocation of disunited parts, and keeping them together by art, till the healing process of nature shall have knit them into one solid mass: such is its use to lacerations or fractures of muscles, tendons, bones and skin. It is obvious, that confining the parts in such cases in apposition, is necessary for their cure; for if broken bones are not placed according to their natural form, a cure of deformity will ensue, and so of all simple wounds. Compression then is the grand coadjutor of that most important practice of modern surgery, the healing by the first intention—that salutary endeavour of the animal constitution to remedy injuries and mischiefs, and which it immediately accomplishes, if no bars or impediments are placed in its way.

THE second species of compression includes the reduction of tumors of soft parts in all the organs of living bodies. In the case of aneurism, whether the coat of the artery be ruptured, or only stretched, in the beginning of the disease, such is the nature and function of the organ, that the mischief is sure to proceed, the tumor gradually growing larger, until it either

bursts, and death takes place from the effusion of blood, or some vital function is interrupted by its tumefaction, unless it is prevented by operation or some curative process. Of the danger of operation by incision, we need not search far to be convinced. The writings of John Hunter, and of Abernethy, and the practical skill of these able surgeons, do not always promise success, and have not generally insured it. It behoves us, therefore, to relieve by other means, if such means are in our power, and capable of being applied. That they are in our power, by compression, I shall prove from Guattani, and from cases within my own experience.

“ ABOUT the end of August, in the year 1765, a man was brought to the hospital, by name Antonius Valera, and by trade a porter; he was in his fortieth year, and of a gross habit of body. At this time he was afflicted with a spurious aneurism of the poples, which in size and shape was like a goose’s egg, attended with hardness, and resisting the touch in every part of it, with much fever, pain, a strong pulsation, and a swelling of the leg and foot. In this state, as the limb was swelled, I did not think it prudent to adopt the plan I had laid down, before I had lessened these symptoms, lest I should not succeed, and the joint be liable to mortification. I therefore ordered, that the patient should remain some time quiet in his bed, use a rigid diet, and lose some blood. This caution was of so much

service, that the aneurism did not only not increase, but also in the month of September the pain was gone, the pulsation not so great, and the swelling of the leg and foot much diminished. But as I could not give any good excuse for not accompanying the Pont. Max. into the country, I thought I might leave this aneurism (being in so favourable a state) till my return, which happened on the 24th of October. On my return to Rome, therefore, when I found the tumor in the same state, and the swelling of the leg almost gone, I determined to proceed to compress it, which operation was performed in the following manner:—Some cloths dipped in wine and water being applied for some days before, I began to cover the whole tumor with proper lint, and crossed two oblong cushions in the centre of the tumor, in such a manner, that the upper end of both might include the knee in the higher part, and the lower end, in the lower part. Another cushion, made wet also with wine and water, being extended near the length of the crural artery, even to the groin; I moistened all the cloths also, with which I had covered the whole circumference of the knee and the extent of the whole thigh. I then used a strong and long roller, about three fingers broad, and beginning above the centre of the tumor, I passed the roller both above and below it, in such a manner as is usually done when this joint is to be bound up, and wrapped the roller as often round the tumor itself as was necessary, that it might be properly confined by the bandage,

and also compressed equally on all sides. I pursued this plan in the same way through the length of the thigh, even to the groin, and to render it more secure, I ended it by wrapping it twice round the body. The greatest caution I used, that I might not bind the part the first time too tightly, and I was very careful that the compression might be equal, so that every time I passed the roller round, it might cover a little more than half the breadth of it; which indeed, in every surgical operation of this sort, where you wish an equal compression, ought to be observed. These things being done, I prescribed bleeding and a rigid diet. I advised the patient also to be chearful, and particularly I begged that he would keep the joint as quiet as possible. I then ordered spirits of wine to be dropped upon the tumor, covered as it was with the roller. I left the bandage untouched, because it seemed to be as I could wish it: indeed it is usual to let it continue (if it be properly done) eighteen, or even twenty days. But when I was compelled to remove it, I made use of the following caution:—In beginning it, I always took care that it should be made somewhat tighter than it had been the time before. I also made a moderate section of the vein, more especially when either the leg or the foot swelled in the smallest degree; which section of the vein freed me from the necessity of altering the bandage, if it were at all tighter than was expedient for the patient. Lastly, I did not use spirits of wine to the cushions, or wet cloths, that I might avoid a too great heating of the skin, which would have a good deal retarded

the progress of the cure. Having been thus patient and diligent in my method, I was glad to see the tumor (although it always kept its hardness and pulsation) decrease more and more every day, and indeed so much, that reckoning from the day of its compression, I saw the patient in exactly three months leave the hospital, quite cured: so also did my colleague witness it, as well as the other young men, who came there to study. For there was nothing left in the seat of the ruptured artery, except a little hard substance, about the size of a large bean; and although when he left the hospital, he was obliged for his livelihood again to become a porter, and constantly to be in motion and carry great weights, without choice of diet; yet, notwithstanding, he suffered no inconvenience, except the swelling of his leg and foot, which, however, was no trouble to him. In the year 1766, being seized with one of the fevers which were prevalent at that time (namely, the double tertian) he returned to the hospital, where he was cured, and without his poples being affected from the increased motion of the blood by means of the fever. Since neither walking, nor labour, nor the increase of the fluids by fever, had at all irritated the poples, it is probable that an entire liberty, even in the joint, was given to the fluids to pass through the vessel.

“ ANOTHER similar aneurism was cured in the same way on one Damianus, in his 40th year, of a middle stature, by trade a common bearer, of a gross and bilious habit, who was

admitted in number 5, amongst the patients under my care, on the 9th of August, in the year 1767. The extent of the aneurism was larger than the one last described, attended with acute pain, fever, strong pulsation, and swelling of the leg and foot, yet not so hard to the touch, but, on the contrary, it was rather soft. When it was asked of him, how the tumor came? he answered, from a violent exertion during Lent. For whilst he was carrying a seat, dedicated to the sacred confession, from one part of the church to another, he felt, as it were, a separation in the knee-joint, which gave him pain, but not so great as to prevent his usual labour before Whitsuntide. From this time to his coming to the hospital, he was ignorant of the nature of the swelling, although he observed it increase, and he made use of no remedy, except some common ones, to lessen the pain. In the first eight days, therefore, it was sufficient for me to order the patient being kept quiet in bed, a rigid diet, and to bleed him twice. This produced an amelioration of all the symptoms, and the tumor became still softer. I then applied wet cloths for some days, and afterwards proceeded to a compressive bandage, though in a moderate degree, which I repeated as was necessary, and early in November, when I again applied it, I found that the pulsation had entirely ceased, and the tumor entirely dispersed. Still I did not cease to apply the roller to the part affected, in the same way which I above described, and with such success, that the

patient left the hospital, quite cured, on the 27th of December, with no other inconvenience but a little lameness.”*

MANY other cases might be adduced from Guattani, in which pressure succeeded for the cure of aneurism. But those I have quoted are sufficient as examples, and Guattani’s excellent work will amply repay the attention of the reader, if he wishes for others. I shall proceed to relate some cases, which hitherto have not been made public.

Mr. T. a gentleman of Birmingham, about thirty years of age, after a day’s hunting, felt a considerable pain in his thigh, which he considered as rheumatic; in about a month the thigh became generally swollen, and he perceived a small pulsating tumor, situated about four inches below Poupart’s ligament, on the inner side of the thigh, in the course of the femoral artery; the pulsation continued to increase for some days, and the leg and thigh became œdematosus. A consultation was called with the late Mr. Mynors, and my Brother, the late Mr. John Freer, with whom I was then a pupil; they were decided in their opinion of the case being an aneurism of the femoral artery, and immediately ordered their patient to bed,

* *De externis aneurismatibus manu chirurgica methodice pertractandis, &c. opus Caroli Guattani, CLEMENTIS XIV. PONT. MAX. Secretioris Chirurgi. Romæ, 1772.*
Vid. Historias, vi. and vii.

bled him copiously, and put him on a low diet. On the following day, compresses were applied above the tumor, in the course of the femoral artery, as high as Poupart's ligament, and the whole limb was rolled equally and tightly from the foot to the groin. The application of the roller increased the pain, and brought on a good deal of fever. Saline julep was ordered, and he was again bled. The bandage was continued, but it still produced a degree of pain, and he found little relief from opiates, which were occasionally given. This plan was continued for some months, and as neither the tumor, the pulsation, or œdematosus swelling increased, some hopes were entertained of effecting a cure by pressure, and eventually they were not disappointed. But on a sudden, the whole limb became extremely cold and benumbed, the tumor and upper part of the thigh put on a livid appearance, and serious apprehensions were entertained for the safety of the limb, which was hourly expected to gangrene.

ON the morning subsequent to this alarm the pulsation in the tumor had ceased, but the livid colour and defect of sensation continued. The pain was removed, his fever was less, the warmth of the limb began to return and the tumor to diminish, and from this time he continued to recover. In a month he could walk about the house; but it was a long time before he recovered the entire feeling, or that the limb was much reduced. In the course of six months, no inconvenience remained,

except the thigh being at the upper part four inches more in circumference than that of the right side. In this state it remained for twelve years, when it began to increase, and gave him a dull obtuse pain after violent exercise. From his former sufferings he was much alarmed, and requested my opinion. Upon examination, I found a tumor capable of much depression, but there was no pulsation or fluctuation in it. I desired him to give it rest, and apply a rag wetted with spirit of wine and water, which in a few days removed the pain, and he remains at this time (twenty years from the original attack) in good health, and the only inconvenience he experiences is from the size of the tumor, which has latterly grown very large. But the tumor is *now* not aneurismal.

FOR the cure of popliteal aneurism, compression was made use of with success by the late Mr. Mynors, of Birmingham, in the following case:—

THOMAS KNIGHT, aged 35 years, of a robust constitution, and guard of a mail coach, ascribes the origin of his disease to a sudden jerk which he received in jumping off the top of the coach. The knee became generally swollen, and this in some degree subsiding, a small pulsating tumor was felt immediately in the ham. The tumor gradually increased, and in a few weeks attained the size of a large orange, pulsating violently,

and producing much pain in the part, though the limb itself was benumbed. No doubt could be entertained of the nature of the case, and Mr. Mynors immediately resolved to try compression for its cure. The compression was made by means of a roller carried from the toes up the leg and over the tumor. A small pad of linen was then applied to that part of the artery where it passes round the inner side of the thigh to get at the ham. The compress was then firmly bound down by the remaining turns of the roller, which was continued up the thigh. During the application of the roller, the lower limb was affected with agonizing and almost intolerable pain. It was, however, after one of these urgent paroxysms that the pulsation in the tumor was found to have ceased, and his pain very nearly abated. The roller was continued for some weeks, during which the tumor considerably diminished. Knight is now well in health, and although it is two years since the remedy was made use of, he experiences no inconvenience, except a little lameness, which arises from the tumor and the contracted state of the limb.

WHILE writing these remarks, it has fallen to my lot to examine the body of Ann Poolton, who was admitted into the Birmingham Hospital in the early part of the year 1806, for an aneurism of the aorta. The tumor was found immediately above the sternum, violently pulsating at all times, but was much in-

creased upon the least exercise, it gave pain, and produced difficulty of breathing. She was bled, her bowels evacuated, and was put upon spare diet; which plan, combined with rest, gave much relief, and the violence of the pulsation was diminished. In this state of apparent recovery she remained for some weeks, when the pulsation and difficulty of breathing again returned: she was desired to live upon milk and vegetables, one grain of opium and ten drops of the tincture of digitalis were given every night and morning, which in a few days produced a favourable effect, the pulsation became bearable, and the tumor evidently less. This plan was continued for a month, when the patient found herself so well, that she requested to leave the hospital. In a few months she called upon me, and said she experienced little inconvenience from the disease, except upon particular exertion, which increased the pulsation, and brought on a very distressing difficulty of respiration. I advised a repetition of the digitalis, which again relieved her for a time. In March, 1807, she was again afflicted with difficulty of breathing, which evidently arose from pressure upon the trachea, although the tumor was not outwardly increased, nor the pulsation so violent as before; she became much weaker, and her pulse very low; wine and water was allowed, and light nourishing food and cordials were given, which she swallowed with difficulty, her face became daily more purple, and on the 20th of April she died.

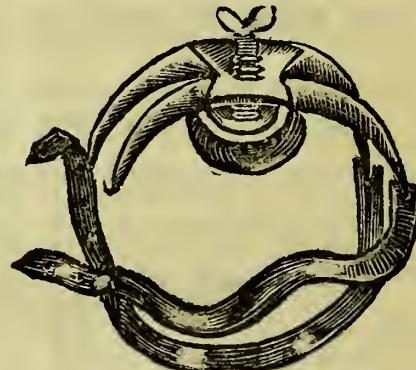
WHEN we examined the body, the aorta was found very much dilated; this dilatation originated immediately above the semilunar valves, and extended to the arch of the aorta, at which place the vessel appeared to have bulged, and a sac formed larger than a goose's egg (without any appearance of rupture of the internal coats) out of which sac the right carotid went off.

WHEN the tumor was opened, and cleared of its contents, the inner membrane was found to be stellated with depositions of earthy matter, and the sides of the sac were of equal thickness with the other part of the aorta, the upper and posterior side of the sac was filled with layer upon layer of coagulable lymph, which was become firm and hard, leaving a free, open, and smooth passage for the blood on the lower and anterior part, from which the carotid and subclavian arose.

HAVING dissected the tumor, I was desirous of examining the state of the other arteries, in all of which I found some degree of inflammation, the internal coat of the aorta descendens, was of a pink colour, much inflamed, and very similar to the one described in page 17, plate 2; so also was the pulmonary artery, with its ramifications. Whether these inflammatory appearances would be sufficient to account for the death of any patient, I cannot determine. In this case, the patient probably died from the compression of the trachea, by the tumor, producing suffocation.

FROM the cases here brought forward, selected from many, I do not hesitate to recommend the cure of aneurism to be attempted, in the first instance, by pressure, rather than an operation, which frequently occasions death, even when the patient might have recovered, if left to nature alone.

COMPRESSION may be applied either on the aneurismal tumor itself, or upon the sound artery above it. In those cases where pressure has been hitherto applied, it has been, upon the tumor itself; and though this mode of application has frequently been attended with success, it is by no means so likely to answer the intention of uniting the sides of the vessels, as when used on the sound part of the artery. From the result of those experiments I made upon the radial artery of a horse, I should recommend the pressure to be applied on the extremities, either by the assistance of Senffio's instrument, which is copied in Platner's Surgery, and given here in the margin, or in the following manner:—First, place a bandage moderately tight from one extremity of the limb to the other, then place a pad upon the artery a few inches above the tumor, that you may have a greater probability of its being in a sound state; then with a common tourniquet surrounding the limb,



let the screw be fixed upon the pad, having previously secured the whole limb from the action of the instrument, by a piece of board wider than the limb itself, by which means the artery only will be compressed when the screw is tightened, the tourniquet should then be twisted till the pulsation in the tumor ceases. In a few hours, as by experiment in the horse, the limb will become oedematous and swelled ; the tourniquet may then be removed, and no stronger pressure will be required than can easily be made with the pad and roller. The irritation produced by this mode of pressure, excites that degree of inflammation of the artery, which deposits coagulable lymph in the coats of the vessel, thickens them, diminishes the cavity, and eventually obstructs the passage of the blood.

SUCH are the practical advantages of compression, and when any portion of vital power remains, I know of no exception to its use.

ALL the soft parts of the body, as we have before observed, are elastic ; they are capable of being stretched out, and they are capable of being contracted. Now an artery is composed of materials peculiarly contractile. In those experiments instituted for the purpose of ascertaining the power of contraction of arteries, it was found, that the aorta of an ass was contracted, by gradually depriving the animal of all its blood, till the cavity

was nearly closed, and the whole artery only resembled a cord, not a canal. A power of contraction so great, admits in a contrary direction of an equal dilatation. By a force gradually applied, an artery is capable of being stretched into ten times its usual diameter.

BUT, independently of mere elastic power, the functions of arteries predispose to the formation of certain diseases. As arteries are living and irritable canals, which suffer the constant permeation of a fluid, of course they are constantly acted upon by their contents. These contents may vary in their chemical constitution, as the arteries themselves in their degree of vital power, or of health; but in all cases, the canal will adapt its dimension to the quantity of its contents. If the fibre is infirm, it may be sooner torn. If it be torn, or give way in any other mode, the part will have a tendency to bulge. The impetus of the fluid passing along, is equal against every fibre. The infirm, or torn fibre, makes less or no resistance: the artery there then begins to yield—each pulsation makes it yield more and more, till at last the tumor becomes visible, and an aneurism is formed.

MAIN are the attempts of medicine to heal such a mechanical disposition. Tonics and sedatives may give power or abate action; but the mechanical impression of a force constantly

beating against the elastic fibres of a canal, some of which are weaker than the others, will necessarily exert more power upon the weak ones, and on this side the canal must bulge, and perhaps break. In such a case, it is clear that the only remedy is to prevent the bulging out, and this can be only done by applying such a power as shall counteract the impulse made on the weak side of the vessel, and thus prevent the increase of tumefaction. It is scarcely necessary to repeat the two ways of accomplishing this end: one by uniting the sides of the artery above the tumor, or between it and the heart; and the other by compressing the tumor itself. I have before given my reasons for preferring the former mode, when it is practicable; but if the situation of the aneurism be such, as not to admit of pressure on the artery, then I have no hesitation in recommending its application upon the aneurism itself. If the tumor be prevented from increasing, nature will generally do all the rest. The coagulum deposited in the aneurism will be absorbed, the coats of the artery will be invigorated, the tendency to disease will be subdued, and nature will finally resume her kindly and salutary functions in the deranged part.

To aneurism of every part of the arterial system, within the reach of compression, is this principle applicable. To all aneurisms in the extremities, it is evidently and easily applicable, and to the great arteries, I conceive it to be much more so, than

is generally believed. Let us, however, not fail to remember the principle, and the application will never be difficult, complicated with that skilful and scientific mode of practice, which must be adapted by the good sense of the practitioner to every particular case.

THE END.

